ICE AND FROST

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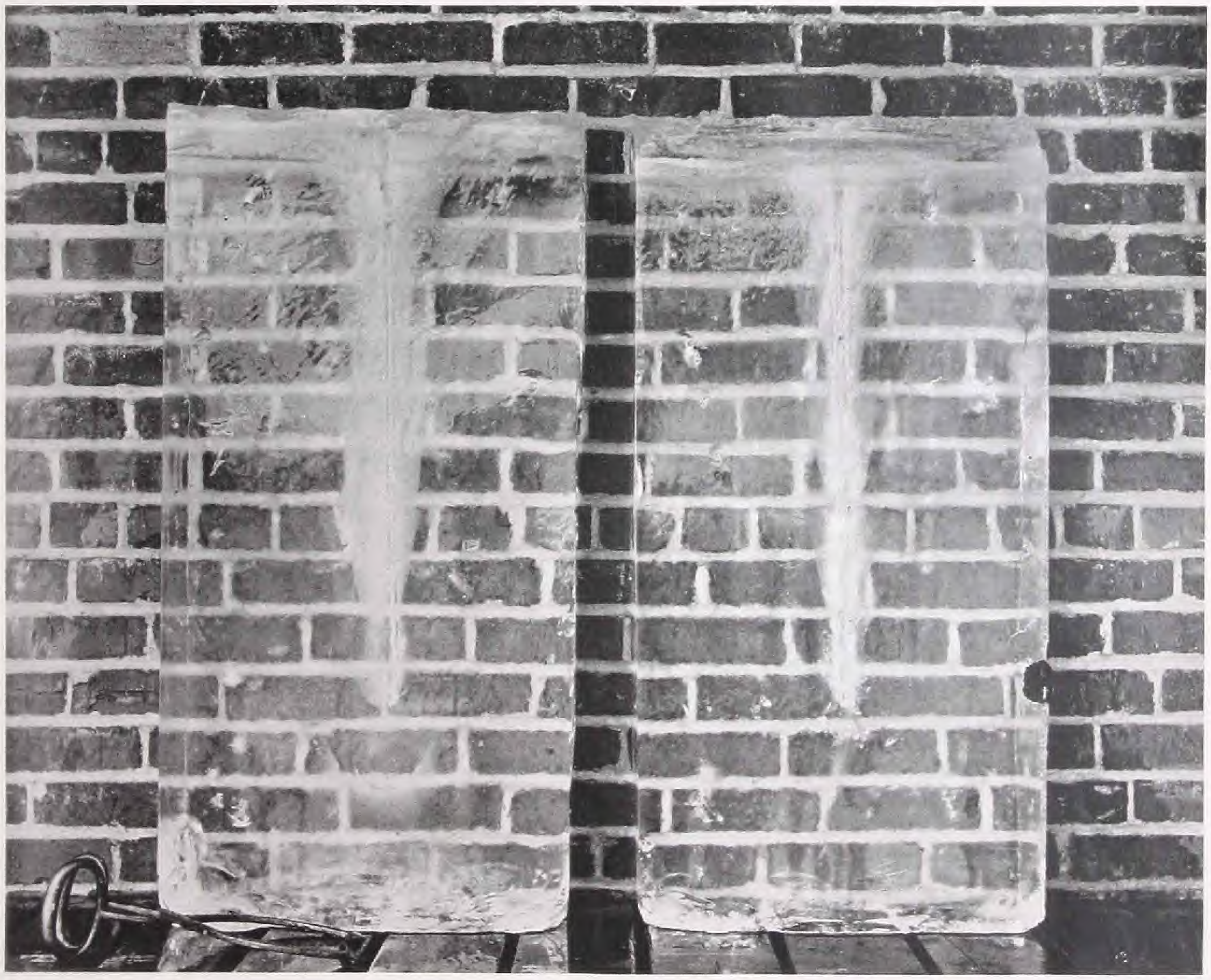
FRICK COMPANY, WAYNESBORO, PA.

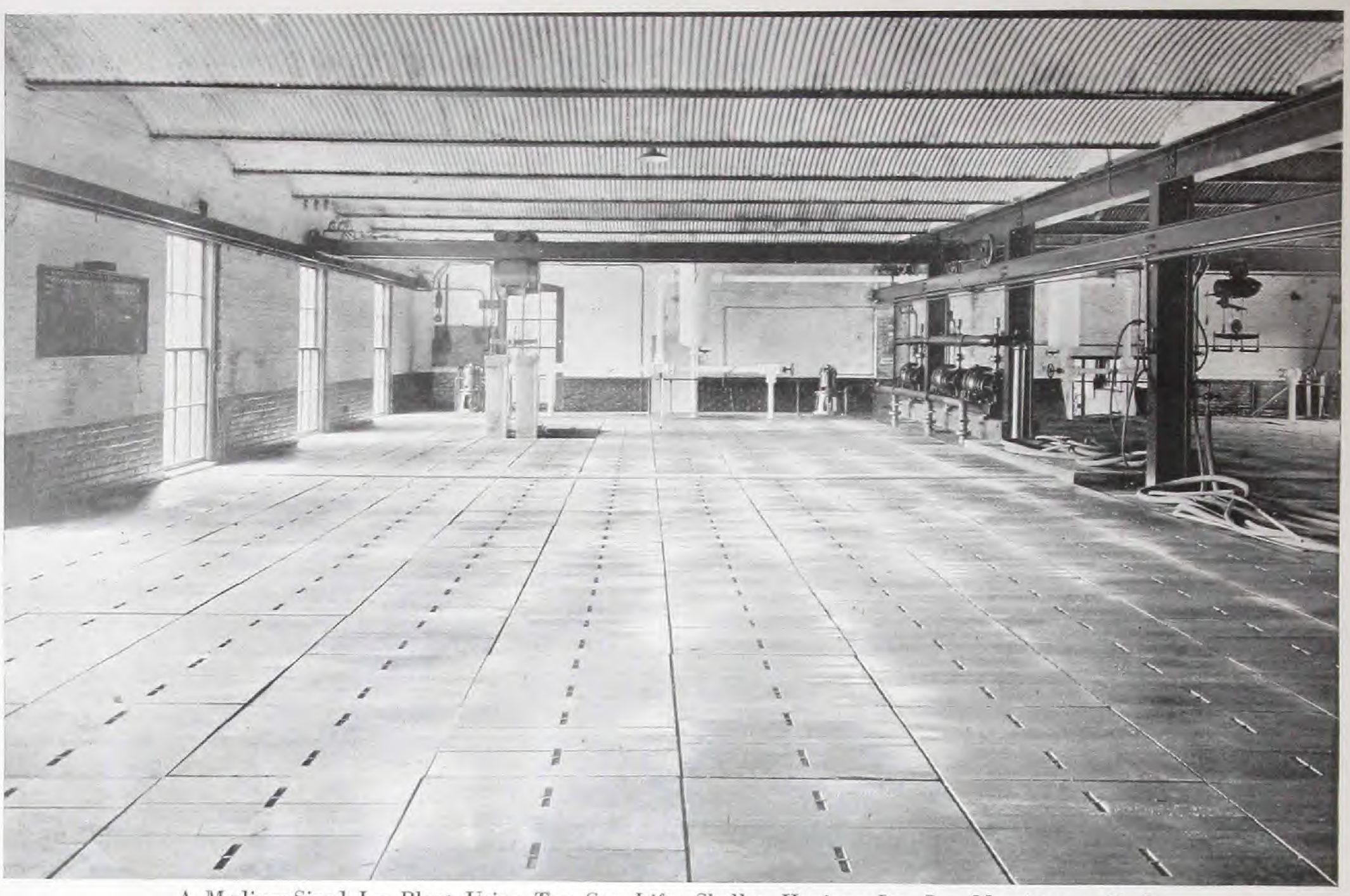


Ice Made at the Electric Ice Mfg. Co., Richmond, Va., by the Patented F-P System, Using Untreated Raw Water

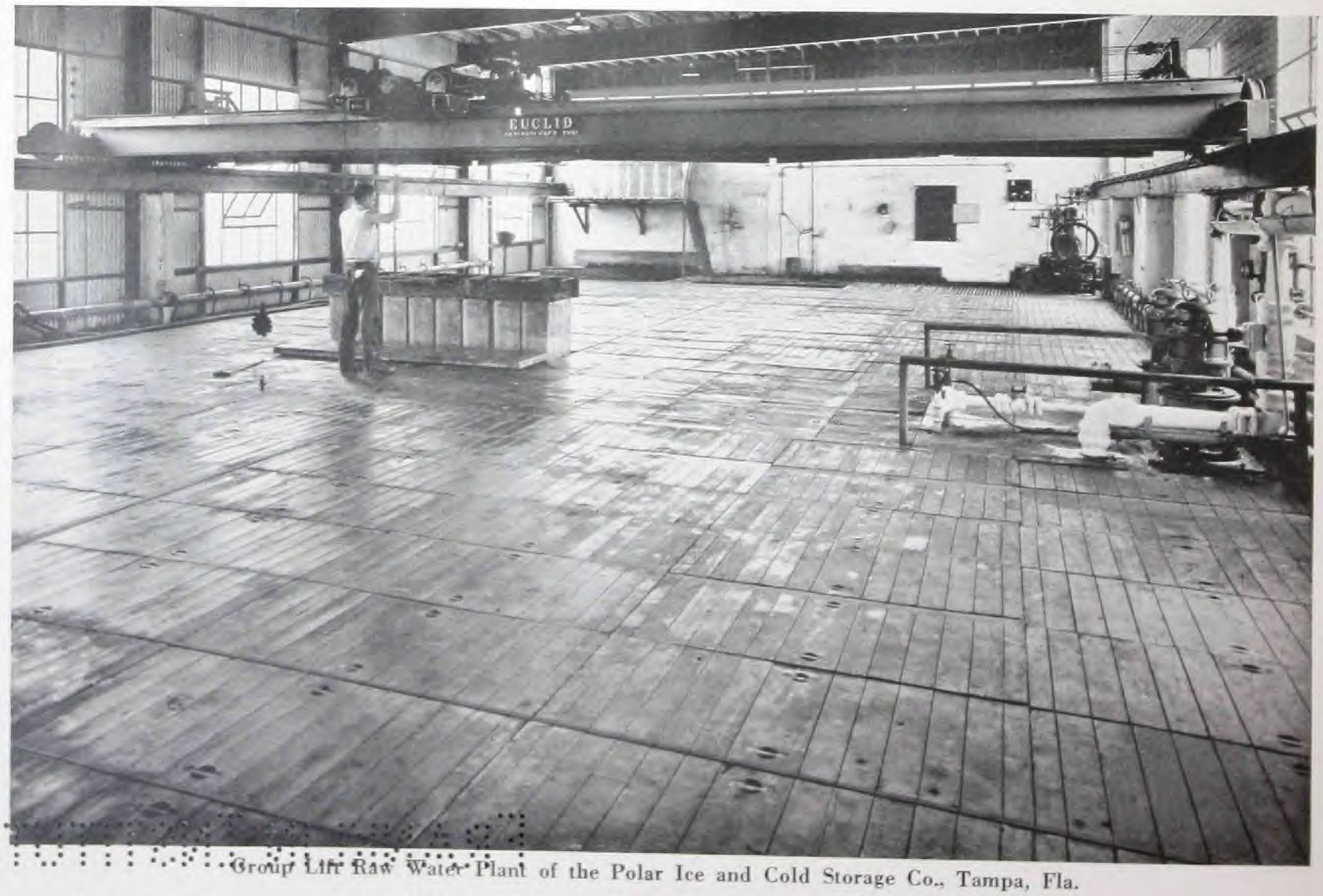
FRICK TRADE MARK

No. 127-D

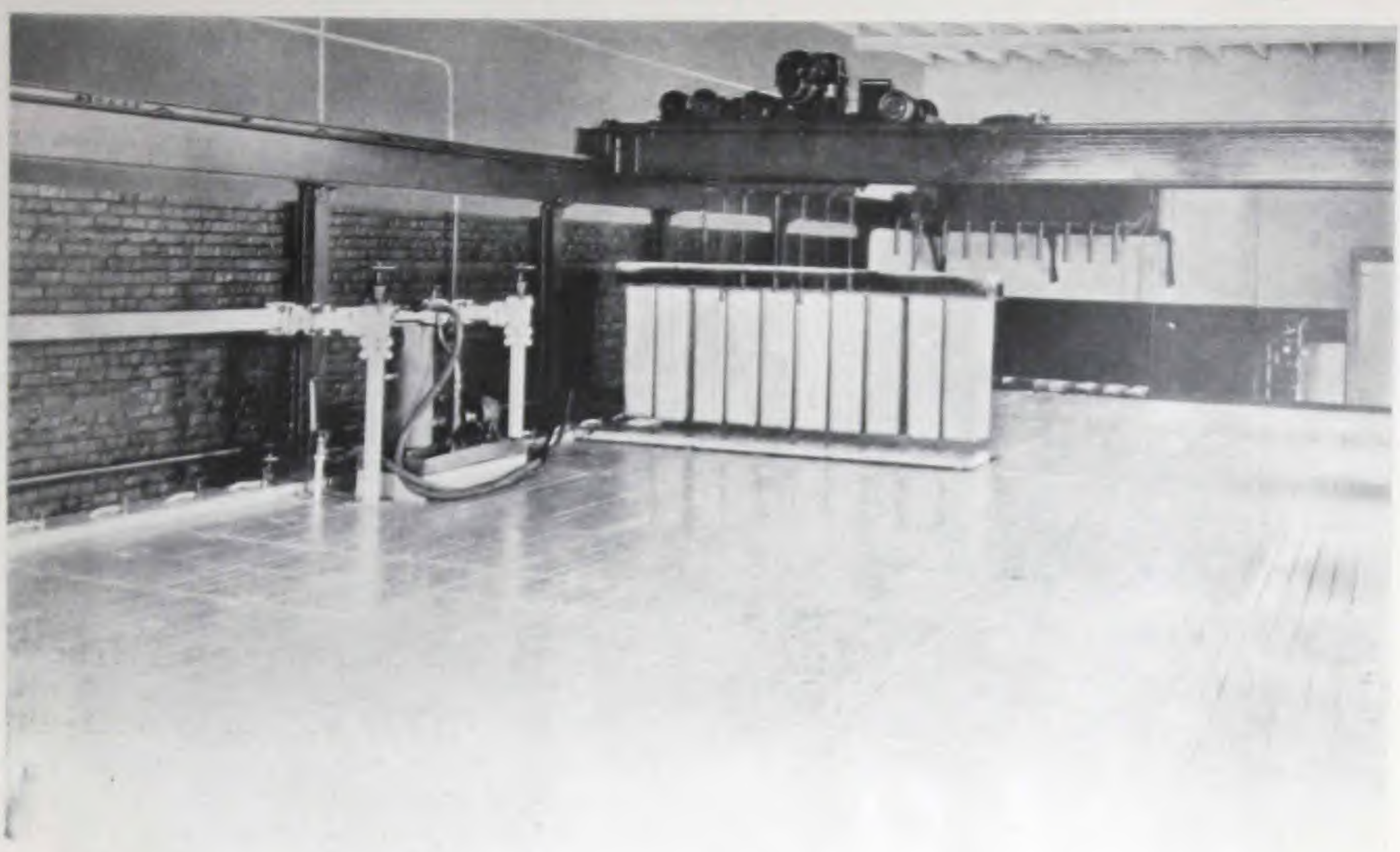
Ice-Making Equipment



A Medium-Sized Ice Plant Using Two-Can Lift; Shelley Hygiene Ice Co., Morristown, N. J.



Group Lift Raw Water Plant of the Polar Ice and Cold Storage Co., Tampa, Fla.



INTRODUCTION

ICE has become one of the necessities of life. The ice-making and refrigerating industry stands today as one of the ten largest in America.

The ease with which artificial ice can be manufactured, and the fact that it can be made close to the market, and at a low cost, have resulted in its general adoption in preference to natural ice.

As is generally known, ice is made by freezing water in cans, the cans being submerged in tanks containing cold brine. The brine is kept at about 16° F. by a series of coils or coolers carrying ammonia; the ammonia evaporates in these, and in so doing absorbs the heat from the water and brine.

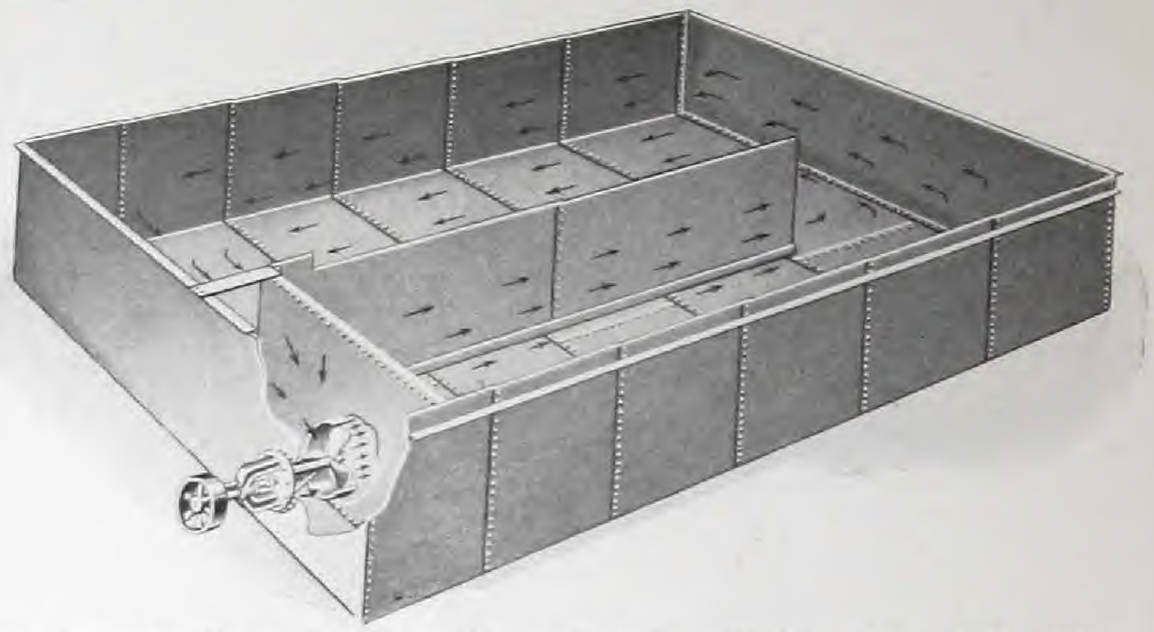
Pure ice can be produced from either distilled water or ordinary drinking water, and special systems of ice-making equipment have been devised to meet the requirements of each method. These systems are described in detail in other bulletins published by Frick Company; in this booklet is a discussion of the main equipment necessary for any ice plant.

Jack Frost

ICE-MAKING EQUIPMENT

Freezing Tank

The freezing tanks made by Frick Company are of the design shown in the illustration, the sides and bottom being constructed from the same sheets, properly bent at right angles and sufficiently rounded at the corners to permit the sheets being easily riveted together. The ends are flanged to provide the rivet lap. This is a most important feature. The tanks are well braced by angle iron around the top. The raceways of all tanks are properly proportioned to insure correct flow of brine for rapid freezing of the ice.



Ice Freezing Tank, Showing Brine Agitator, Bulkhead, and Partition

The steel tank sheets are punched for the rivets, scarfed for caulking, *assembled at the factory*, and are so marked that when the instructions sent with each tank are followed the erecting engineer can assemble the tank correctly and with the least amount of labor. The primary requisite of a freezing tank is that it shall be absolutely water tight, which requires careful fitting to insure tightness with metal to metal joints. This condition is satisfactorily met in Frick tanks by making all joints metal to metal and caulking the seams. The use of paper or other kind of fillers sometimes used for this purpose, and always liable to deterioration, is never tolerated in Frick tanks.

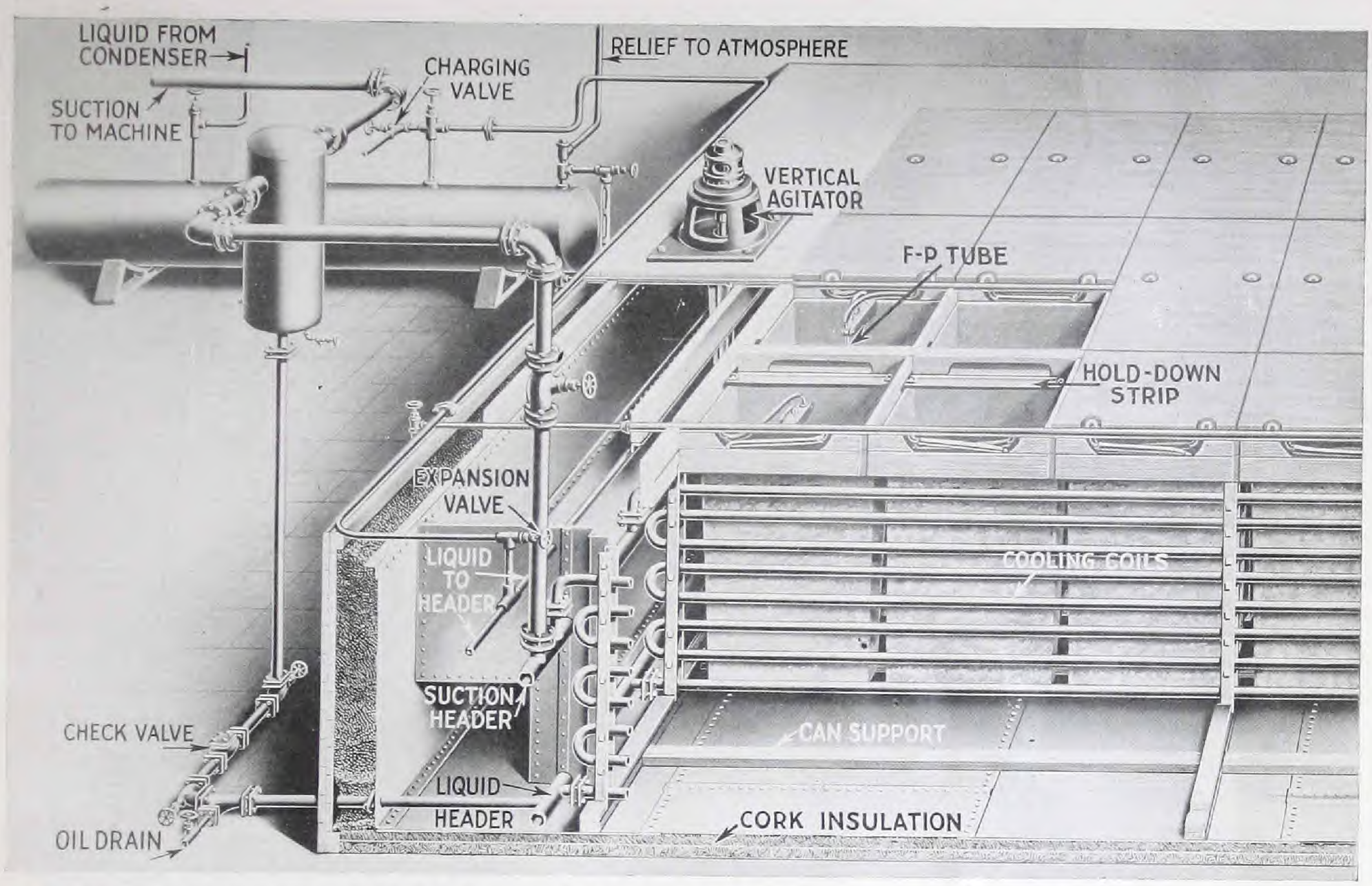
All parts are given a complete covering of water-proof paint before shipment.

All Frick Ice Tanks are Assembled in the Shops Before the Plates are Shipped

Frick Flooded Freezing System

Practically all ice plants built by Frick Company since 1910 have been equipped with the Frick Flooded System. This system possesses special virtues from the fact that with it the freezing tank coils are operated partially full of liquid ammonia. This flooded system, while working on a different principle has proved a success far beyond that originally claimed for it, and it is now the most efficient and economical system for the manufacture of ice. In it the ammonia is made to circulate by natural causes.

A cross-sectional diagram of



Frick Flooded Freezing System, With Oak Framework for Individual Can Lift, Showing Also Raw Water Ice-making Equipment

the Frick Flooded System is illustrated on this page. The principal feature of this system consists in the use of such apparatus as will properly separate the ammonia liquid from the ammonia gas returning from the freezing tank coils. Both come over from the coils toward the compressor in more or less intimate states and quantities, and it is essential to the successful operation of the system that the liquid and gas be separated.

As will be seen from the diagram, the suction line from the tank coils rises through a specially constructed trap, wherein this separation of the liquid from the gas is effected. This trap or accumulator has baffle plates inside and is of sufficient size and depth to permit the liquid to drop to the bottom, while the gas passes off at the top and is drawn into the machine. The separated liquid is automatically returned to the coils and there is a constantly repeated circulation of the ammonia, thus producing high efficiency.

The most important advantage of the Frick Flooded System is that it affords absolute control of the ammonia. The ammonia coils in the freezing tank are so connected into large feed and suction headers that only a single expansion valve is usually required, and the system operates for days at a time without any regulation of the expansion valve.

Another advantage of the flooded system over the old dry gas system is the fact that the surface of the pipe coils will transmit a far greater number of heat units between the warmer and cooler mediums with a liquid on both sides of the pipe than with a gas on one side and a liquid on the other.

Accumulators, as made by Frick Company, are built by welding suitable dished heads to O. D. pipe. All connections to the accumulator are likewise welded so that the finished accumulator contains no joints. The heads are scarfed and the grooves filled with welding iron in order that the weld may be as strong as the pipe. This construc-

tion produces the best type of vessel known for the purpose.

The liquid which drops to the bottom of the accumulator is carried back by gravity to the freezing tank coils by means of a connection between the bottom of the accumulator and the liquid feed header. The gas, as it is formed, seeks the path of least resistance back to the compressor, and for this reason it endeavors to pass back through the liquid return line. In order to overcome this difficulty and insure a proper direction of flow, Frick Company has applied a special check valve, placed in the liquid return line below the accumulator. This valve opens whenever the head of the liquid in the pipe and accumulator is sufficient to overcome the weight of the valve. This check valve gives positive and satisfactory service with next to no attention. Two stop valves, one on each side of the check valve, are installed in order to make it easy to remove and clean the check valve should this be necessary.

Accumulator

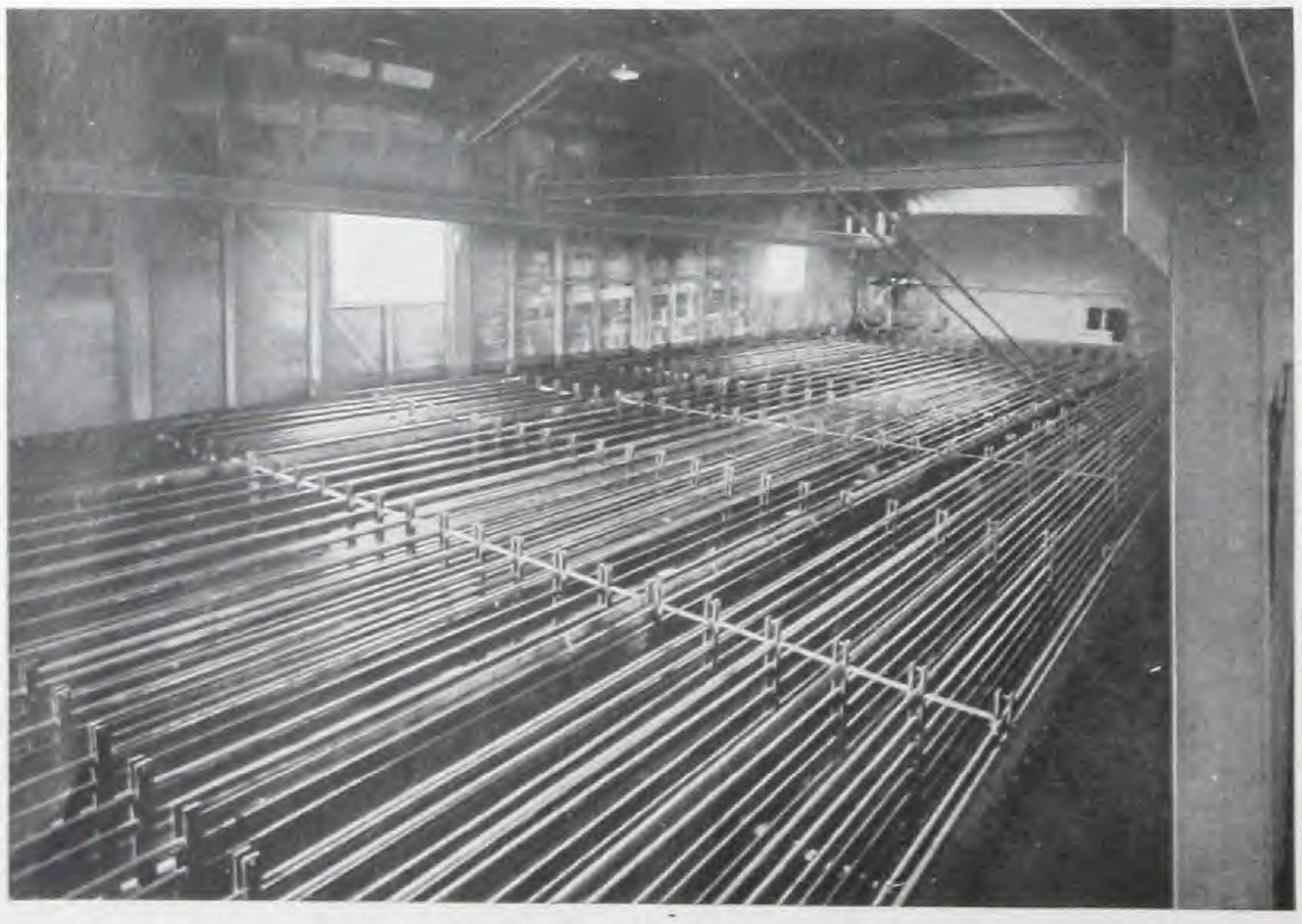
300-Ton Frick Ice Plant Using Group Lift

The simplicity and dependability of the Frick Flooded System have made it a standard all over the world. It simplifies plant operation by reducing the number of feed valves to be regulated; it increases plant efficiency by insuring uniform operation and giving absolute control over the ammonia; it adds to safety by preventing accidents from priming of the ammonia; and it lowers first cost by increasing the heat transfer through the evaporating surface, thus reducing the amount of pipe or brine cooler surface required.

Evaporating Coils

Frick standard freezing tank coils are made of 1¼" selected ammonia pipe, made continuous by the electrical welding process in lengths up to approximately forty feet. Longer coils are made in two sections, joined in the center by standard four-bolt ammonia flanges, sweat soldered to the pipe. The only other thread and gasket joints are those where the coils are joined to the ammonia feed and return headers; standard four-bolt ammonia flanges are also used for making these connections. The headers are of liberal size and threaded joints are almost entirely avoided by using oxy-acetylene welded construction.

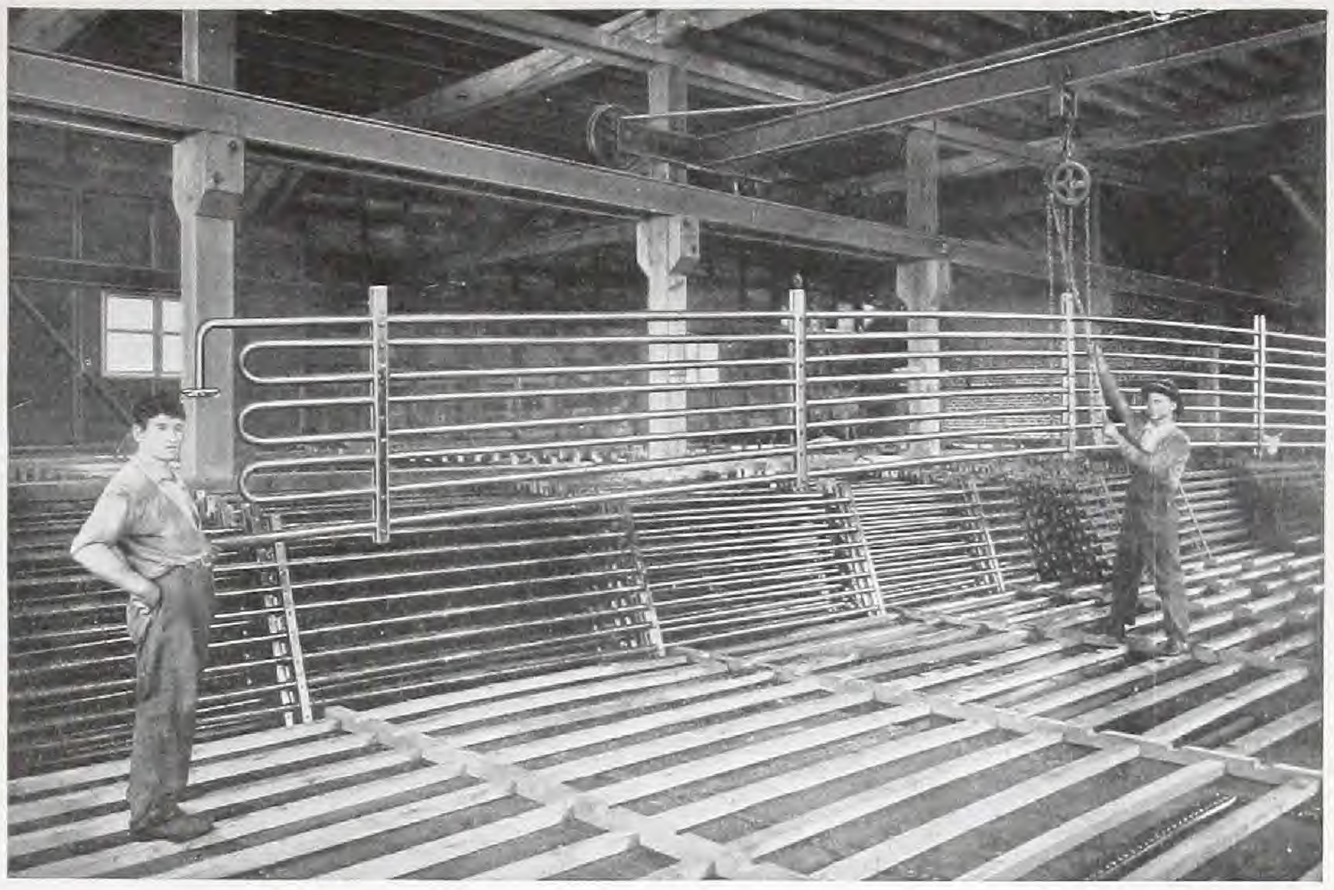
Great care is taken in the electric welding of the coils. The metal at the weld is made thicker than the pipe by upsetting the pipe ends slightly through end pressure ap-



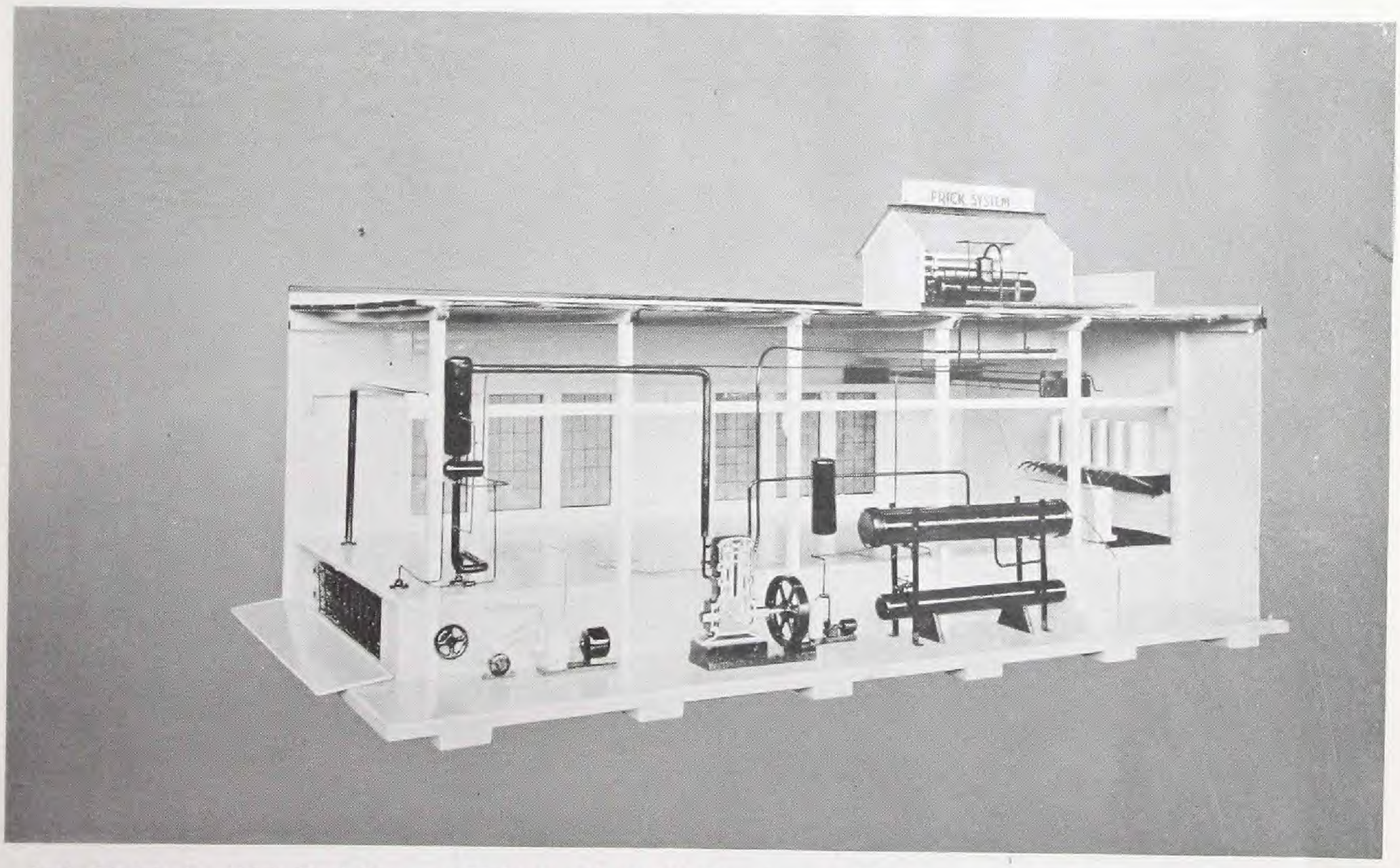
Showing Tank Coils in Position in Freezing Tank Ready for Framework

plied in the welding machine. A special feature of the coils made by Frick Company is this; wherever the pipe is to be threaded, a piece of extra heavy pipe is welded in to strengthen the coil at that point. The finished coils are tested with air at 300 pounds pressure, under water. This type of coil construction is one of the greatest advances made in the refrigerating industry during past years and it greatly reduces the possibility of leaks, with a material reduction of erecting labor needed for assembling.

In order to prevent the coils from becoming damaged in shipment they are carefully crated or braced with wooden stringers.



Erection of Tank Coils, Showing Oak Coil and Ice Can Supports in Place, on Bottom of Tank



Scale Model of a Frick Dual Pressure, Multiple Lift Ice Making System with Vertiflow Unit Evaporator; Water and Liquid Precooling Equipment Shown in Pent House on Roof

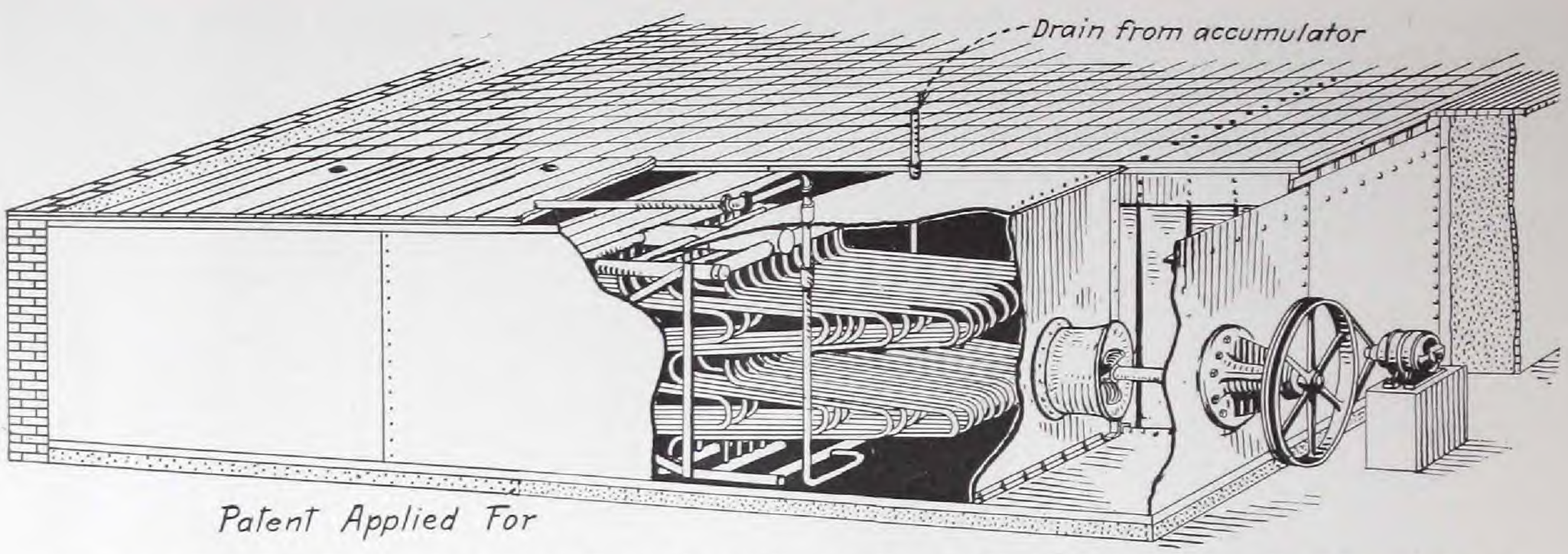


Diagram of Vertiflow Unit in Position in Brine Race, Showing Group Lift Tank With Propeller Type Agitator

Brine Race System With Vertiflow Unit

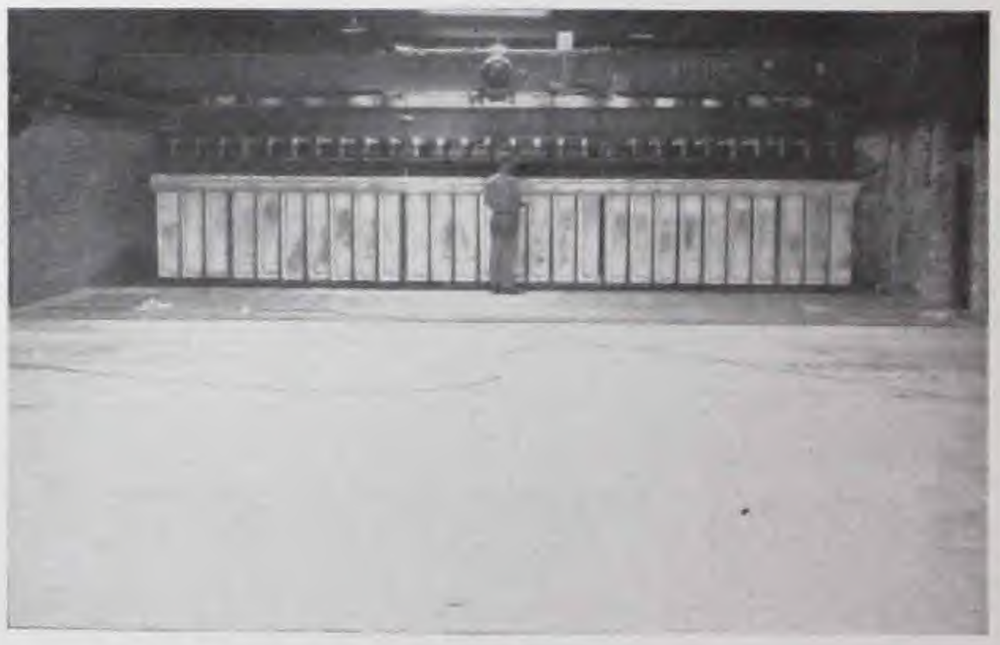
In order to furnish an evaporator made of pipe coils, which would afford the same advantages as the brine cooler described on the next page, we have developed an improved brine circulating system incorporating a new type of cooler known as the Vertiflow Unit.

Referring to the illustrations, the brine is made to flow through the Race at a high velocity by means of a Halvorsen propeller type agitator. The Race is placed across the tank, the short way, to reduce to the minimum the friction and hence the horsepower required for agitation. Baffles above the Unit serve to direct the brine against the pipes, at the same time allowing the Unit to be removed if desired. A float control is installed to regulate the liquid ammonia feed to the evaporator.

The Vertiflow Unit consists of five lengthwise headers with parallel short headers welded across at top and bottom: our Vertiflow W-shaped bent pipes are nested in the space between, as shown, and the structure is braced with angle irons to form a rigid one-piece section which can be installed or removed with ease. This improved Unit provides an ideal cooling surface for those who prefer an evaporator with the brine outside the "tubes"; it utilizes flooded operation to give an excellent transfer of heat, as the ammonia gas is quickly liberated from the individual coils; its headers are of ample size to keep the liquid and gas distribution uniform, and the suction pressure can be maintained at a high level; it saves space; and with the Brine Race is able to hold the temperature difference of the brine over the tank within the closest possible limits.

In addition to the coils shown, we can furnish

The Vertiflow Unit is Rigidly Constructed and is Handled and Installed as One Piece



40-Ton Plant Using the Brine Race System With Vertiflow Unit and Full Row Lift

any kind of coil or cooler, to suit requirements.

Brine Coolers, Submerged

For customers preferring a brine cooler instead of evaporating coils, Frick Company has designed and built a line of substantial welded shell-and-tube brine coolers. These coolers are of the very best material and construction throughout, the tubes being standard 2″ steel boiler tubes, the shells all made from one sheet of flange steel with only one welded seam and the heads made of 1″-thick flange steel. The tubes are expanded into the heavy tube heads.

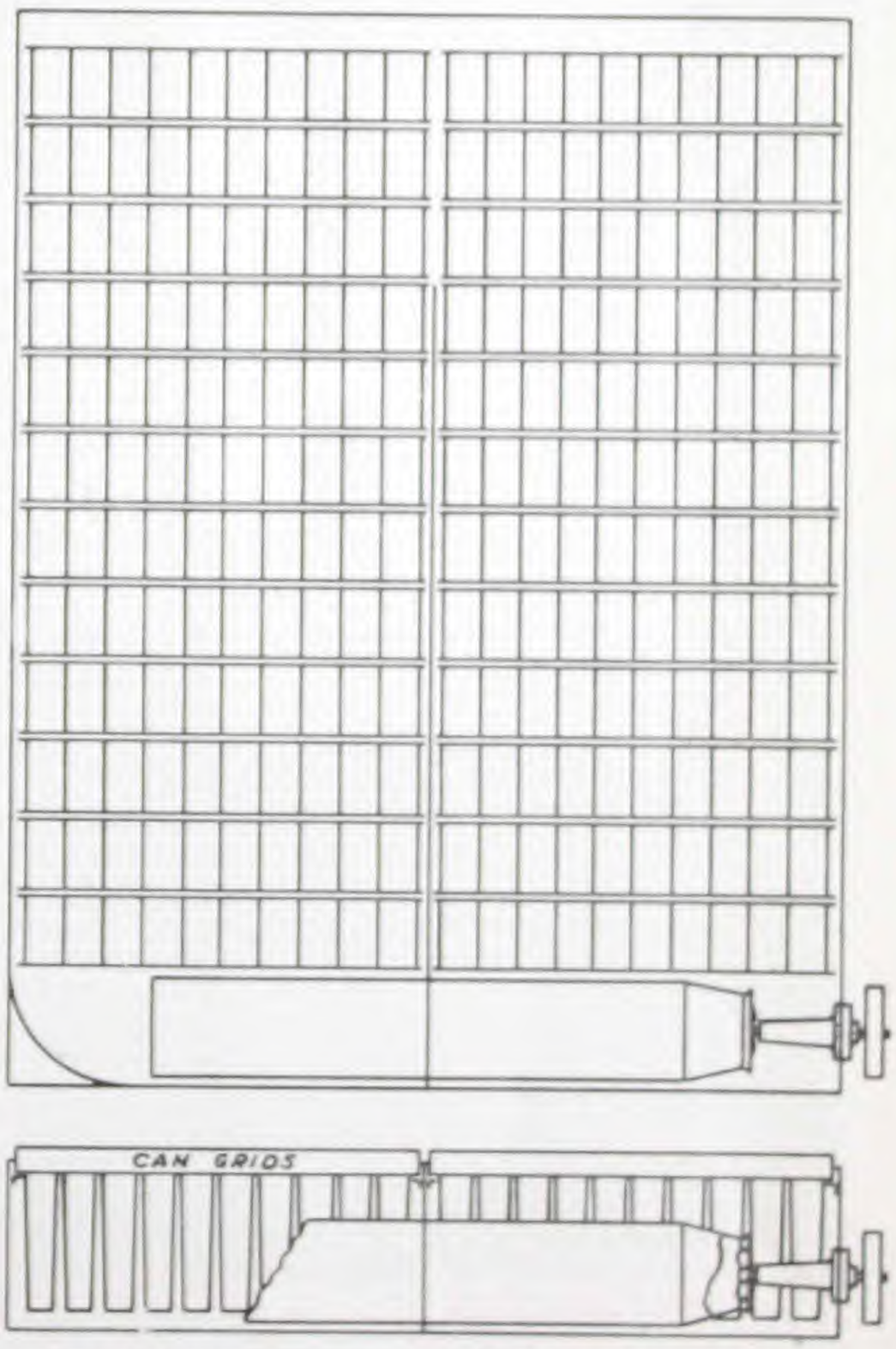
Shell-and-Tube Brine Cooler

Brine coolers are usually installed in new tanks where group lift is to be used; the saving in space, simplification of brine flow, easier handling of the cans, and similar features account for the choice of the shell cooler for group lift plants. With proper design, the brine can be made to pass through the cooler at a higher velocity than is practicable with the usual pipe coils spread throughout the tank; this increased velocity results in a much better heat transfer, and improves the efficiency of the cooler. The cooler is similar to the improved types of coils in that it permits the ammonia gas to escape from the evaporating surface promptly, entering the suction line without loss of pressure. Full flooded operation of the cooler is easily controlled.

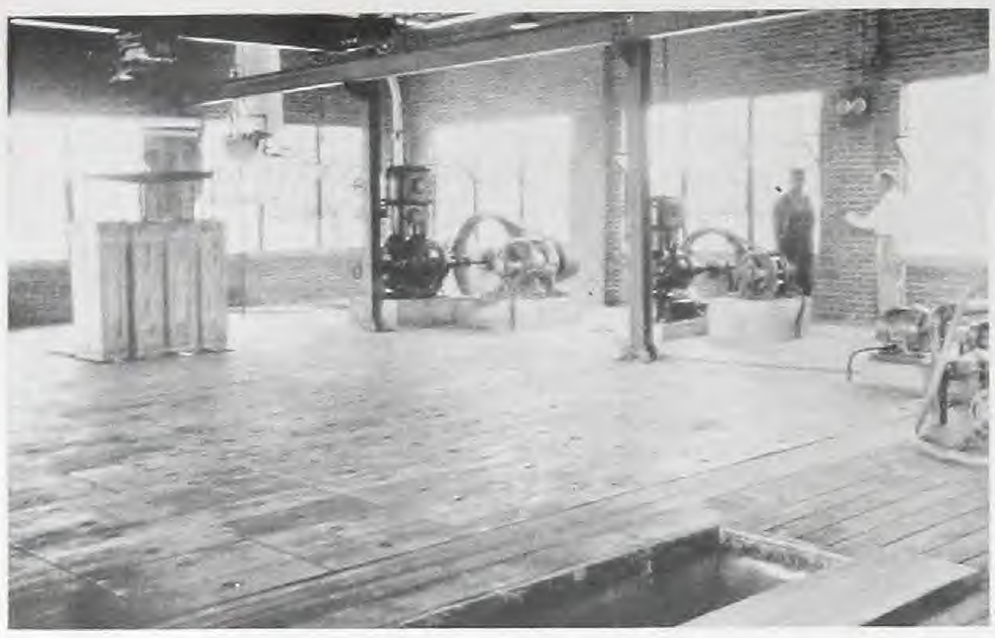
Vertical Agitator for Direct Motor Drive

One, two, three or more coolers are installed in the tank, depending on its size.

The freezing tanks for use in connection with these coolers, particularly the bulkheads and partitions, support the tank framework, and can holders, have all been carefully worked out and proved satisfactory. All of these details can of course be made in numerous grades and types, but Frick Company has spared no ex-



Typical Arrangement of Tank Using Brine Cooler



25-Ton Brine Race, Vertiflow Unit Tank and Machines at Interstate Ice Co., Fredericksburg, Va.

Freezing System at a Frick Raw Water Plant in Houston, Tex.

pense to make the best, for while appearing unimportant they play an important part as to convenience and durability.

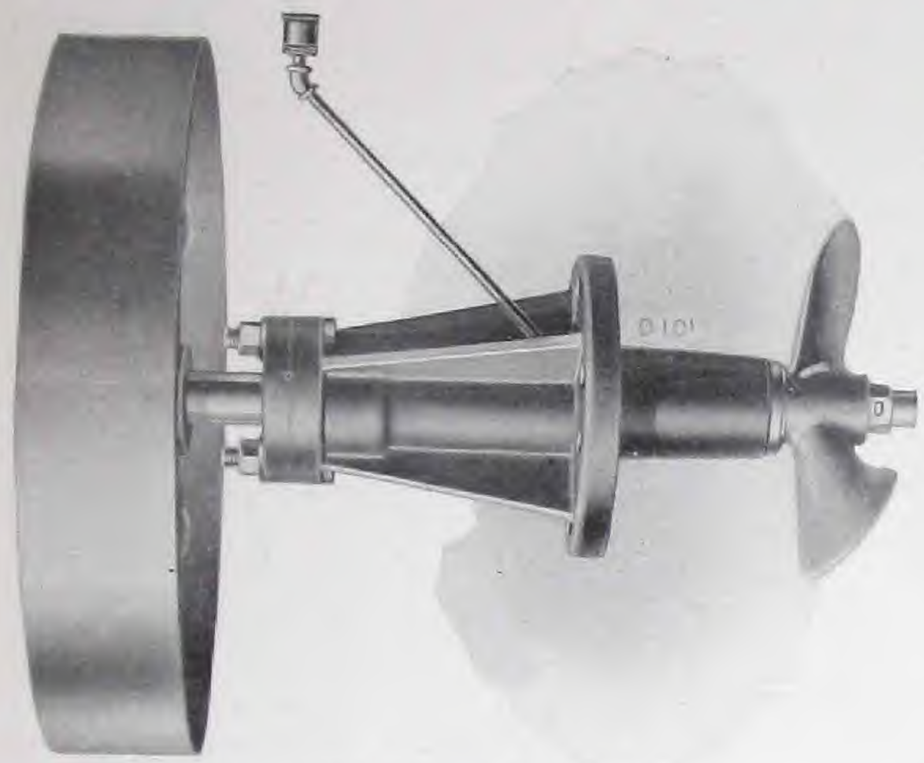
Brine Agitators The character of the brine circulation in the freezing tank is of great importance. A positive circulation must be produced to properly provide even temperatures at all points in the tank. If poor agitation exists, the coldest portion of the brine will always be at the bottom of the tank and immediately surrounding the ammonia coils, so that the ice will form quickly in the bottom of the cans, while at the top the freezing will be slow. This tardiness is a decided disadvantage and in practice often results in the drawing of the blocks of ice while they contain large unfrozen cores or cups. Poor agitation also causes the ice to crack, due to uneven freezing temperatures.

The question of brine circulation has been the subject of extensive experiments, the results of which have shown that the use of a propeller agitator is the most satisfactory way of circulating the brine, in most cases.

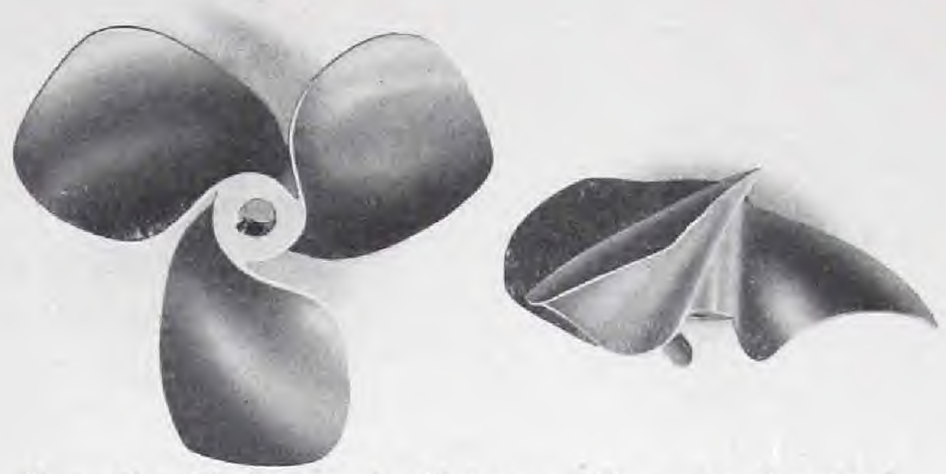
Two types of agitators are manufactured by Frick Company, *viz.*, horizontal and vertical. They are furnished for belt, chain, or V-Belt drive, and for direct connection to suitable motors. All parts used in their construction are liberally designed and will safely carry all reasonable loads met in practice; furthermore, the parts subject

One of Several Frick Ice-making Systems in Japan: Tank Room at Tobata

60-Ton F-P Brine Cooler Plant at Providence, R. I.



Horizontal Agitator for Belt Drive



Propeller Blades of the Halvorsen Type are Standard for Frick Agitators

to wear are accessible and interchangeable. The bearings are made of high-grade babbitt and ample provision is made for lubricating them. The propeller blades are of proper pitch to circulate the correct quantity of brine at the speeds stipulated.

The matter of selecting a suitable agitator to meet certain conditions is a question worthy of the most careful consideration, as an improper agitator will act as a churn without providing circulation. This churning action generates heat which must be counterbalanced by added duty from the evaporating coils. Frick agitators are designed with proper-diameters and pitch, and will circulate the brine with a minimum heat loss. The Frick vertical agitator can be readily removed and replaced in the tank without disturbing the brine.

Ice Cans The standard size ice cans used by Frick Company are given in the table below.

These sizes are in accordance with the standard adopted by the Ice Machinery Builders, Association of the United States some years ago.

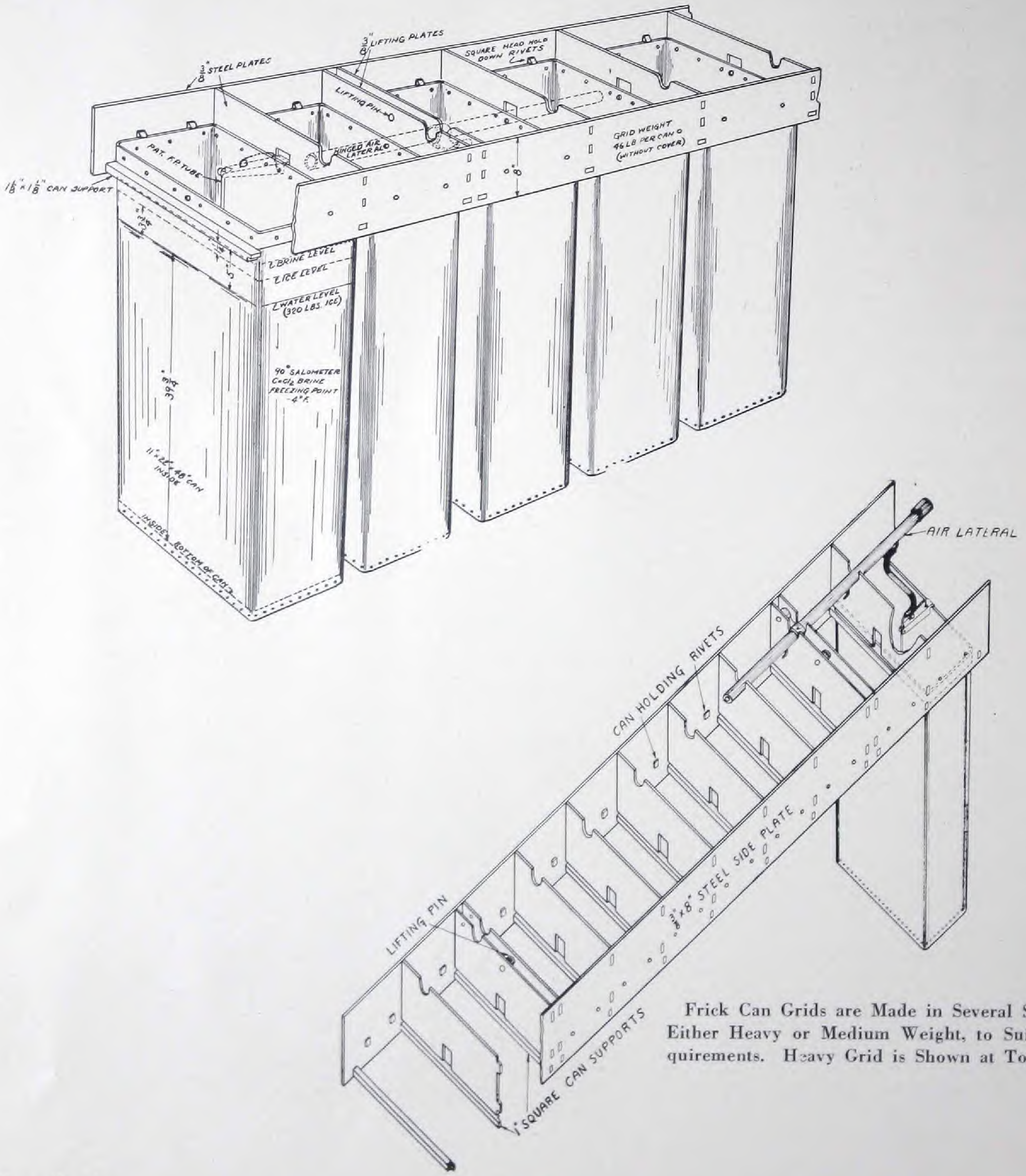
All cans are galvanized throughout, adequately riveted, soldered, and guaranteed water tight. The tops of all cans are strengthened by a heavy band. The lifting holes are punched through this band. All ice cans sold by Frick Company are of latest standard design and construction.

Weight of Cake of Ice	Inside Dimensions			Length Overall	Thickness of Material—U. S. Standard Gauge	
	Top	Bottom	Length		Sides	Bottom
25 Lbs.	3 x 12	2½ x 11½	24	25	No. 16	No. 16
50 Lbs.	5 x 12	4½ x 11½	36	37	No. 16	No. 16
50 Lbs.	6 x 12	5½ x 11½	28	29	No. 16	No. 16
50 Lbs.	8 x 8	7½ x 7½	31	32	No. 16	No. 16
100 Lbs.	8 x 15	7¼ x 14¼	32	33	No. 16-18	No. 16-18
100 Lbs.	8 x 16	7¼ x 15¼	32	33	No. 16-18	No. 16-18
200 Lbs.	11½ x 22½	10½ x 21½	31	32	No. 16	No. 16
200 Lbs.	14 x 14	13 x 13	38	39	No. 16	No. 16
300 Lbs.	11½ x 22½	10½ x 21½	44	45	No. 14-16	No. 14-16
300 Lbs.	11 x 22	10 x 21	48	49	No. 14-16	No. 14-16
400 Lbs.	11½ x 22½	10½ x 21½	57	58	No. 14	No. 14
400 Lbs.	11 x 22	10 x 21	61	62	No. 14	No. 14

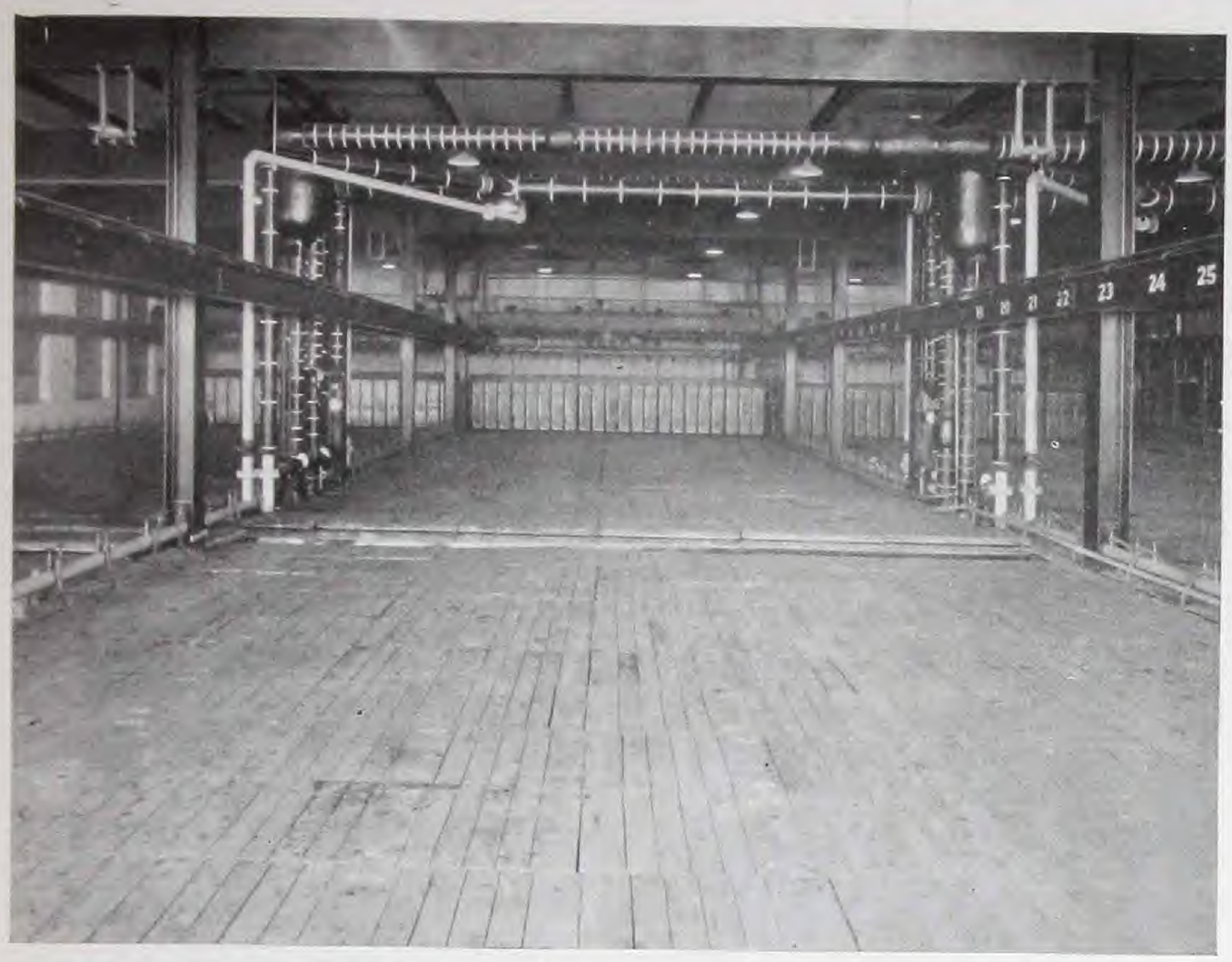
GROUP LIFT

Frick Can Grids

For handling a partial or full row of cans at one time, medium-sized and larger plants are being equipped with Frick can grids. Each grid consists of a strong steel frame, of box construction, to which the cans are securely fitted. The grids are heavy



Frick Can Grids are Made in Several Styles, Either Heavy or Medium Weight, to Suit Requirements. Heavy Grid is Shown at Top



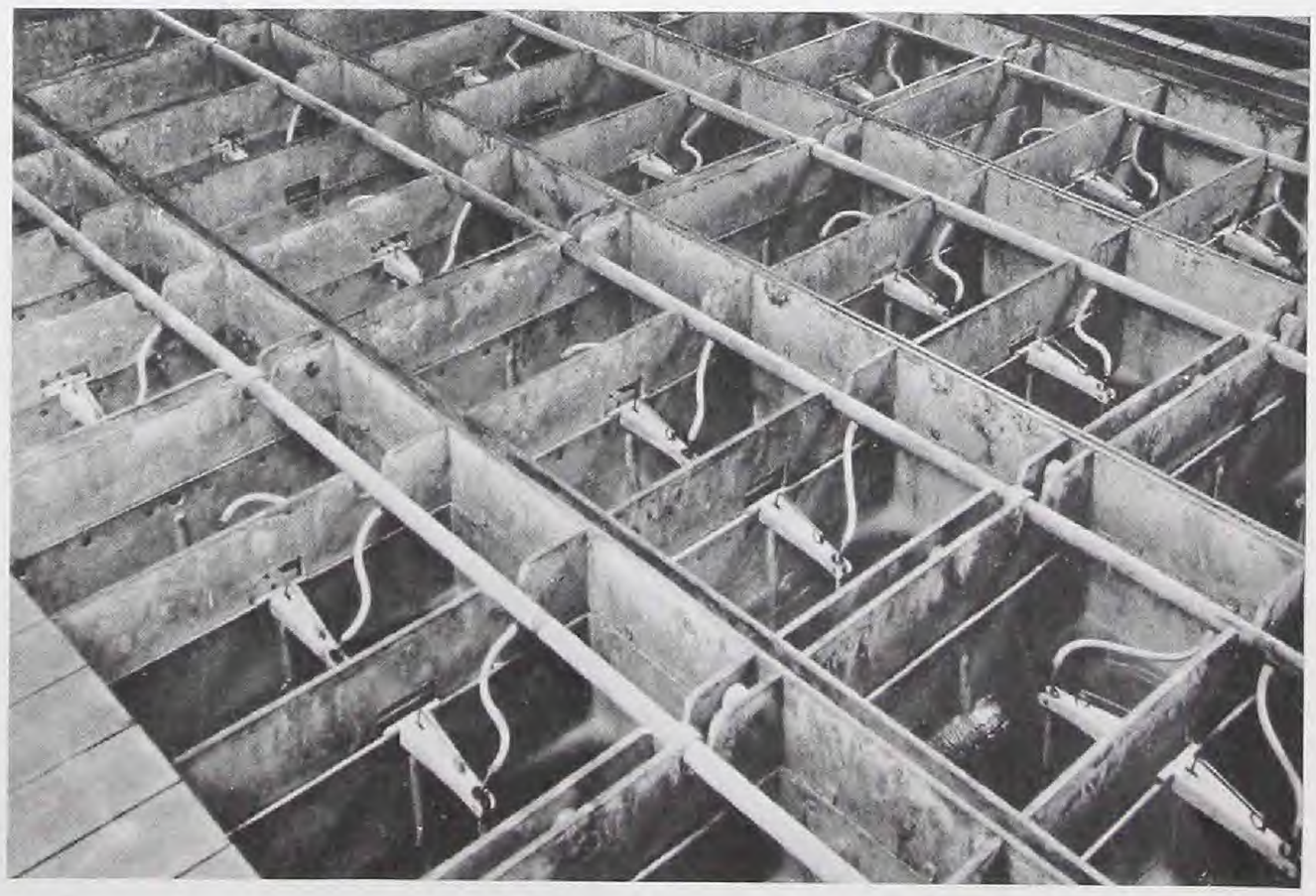
Three 60-Ton Tanks Using Full-row Group Lift at City Ice and Fuel Co., New York City

enough to give ample submergence to the cans, with the attendant advantages of quicker freezing time and oversized blocks of ice, where desired. Being attached to the cans only at their tops, the grids do not interfere with the flow of brine.

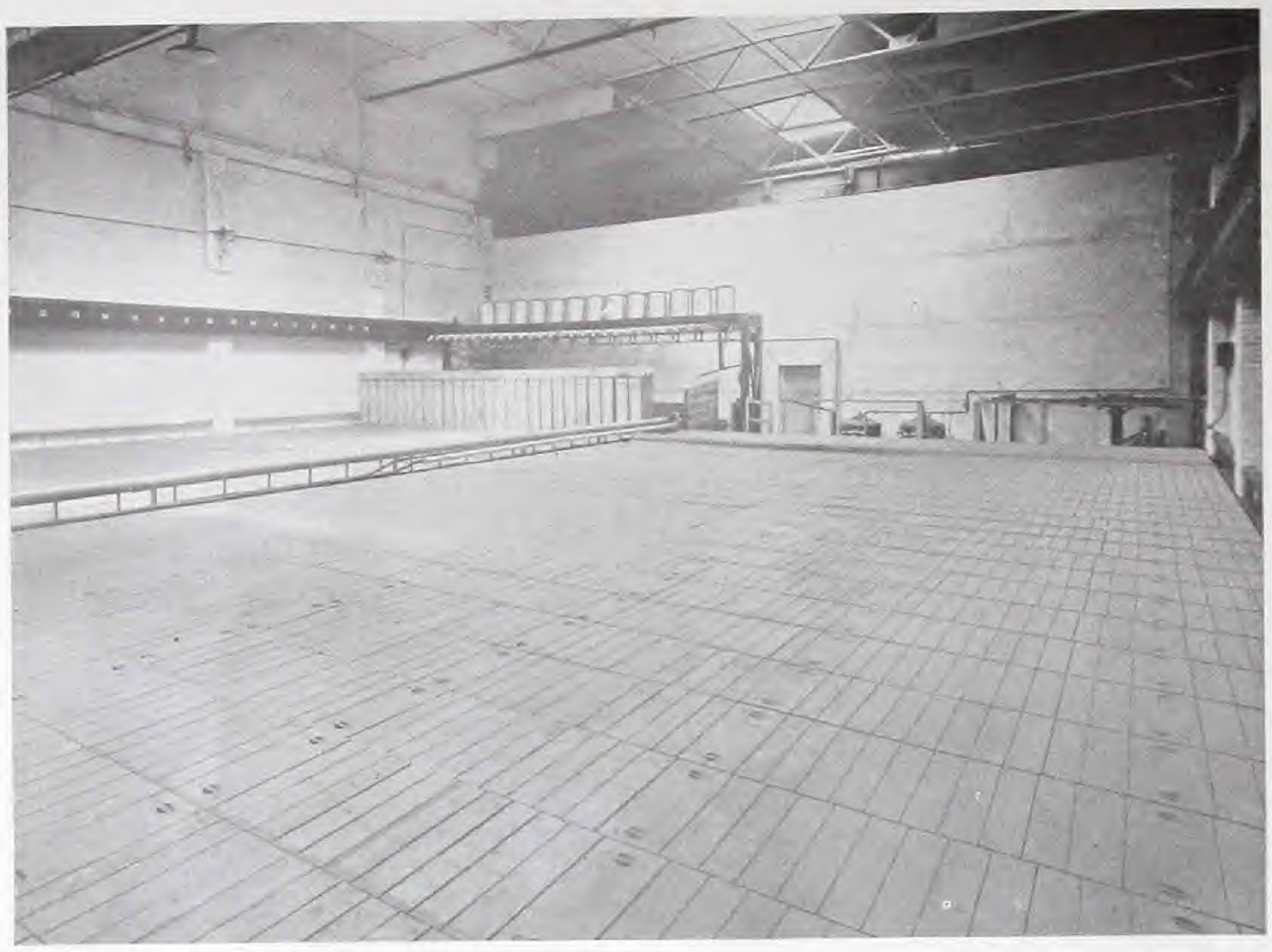
The cans are removable, being held in the grids by steel plates fastened above the cans with soft copper rivets. Removal of a can is seldom necessary, however, as one of the features of the grid system is the lessened wear and tear on the cans—being handled in groups by special cranes, and held in alignment by the grids, the cans last longer with average care. Cans of any standard lengths are used with Frick grids.

The saving in labor made possible with group lift, together with the other advantages here described, have made Frick can grids the choice of many of the finest plants. With this equipment, one man per shift can harvest the ice in a hundred-ton plant, also attending to the cores and standing the ice on end in the storage rooms. In smaller plants the tank man has time to assist with other work. The grids make the job of harvesting so much cleaner, and they save so much physical work on the part of the operator, that competent tank men are attracted to the group lift plant, and the problem of obtaining uniform production in large ice factories is virtually solved.

Frick can grids are arranged to replace the wooden framework on the tank entirely, the can covers resting directly on the grids. The air laterals are either hinged to the grids and swing out of the way when the ice is being dumped, or are lifted from the grids, tube and all, before the F-P air tube is frozen into the ice. The crane hooks remain engaged with the lifting pins on the grids throughout the harvesting process; after being thawed in the dip tank, the cans are placed on a special dump board, and are tilted over by simply "lowering away" on the crane. After the ice has slipped out of the cans they are raised to the vertical position on the dump board and are refilled with water from the filling tanks on the wall.



Close-up of Grid Tank Showing Grids in Place and General Arrangement of Hinged Air Laterals, F-P Tubes and Brackets



100-Ton Plant at Lowell, Mass., Showing Adjustable Can Fillers

The grids are used with tanks having either coils or brine coolers, and can be fitted to existing tanks where improved harvesting equipment is needed. They are furnished with side walls of 3/8" steel, in widths of 5", 6" and 8", to suit requirements.

Cranes for Group Lift

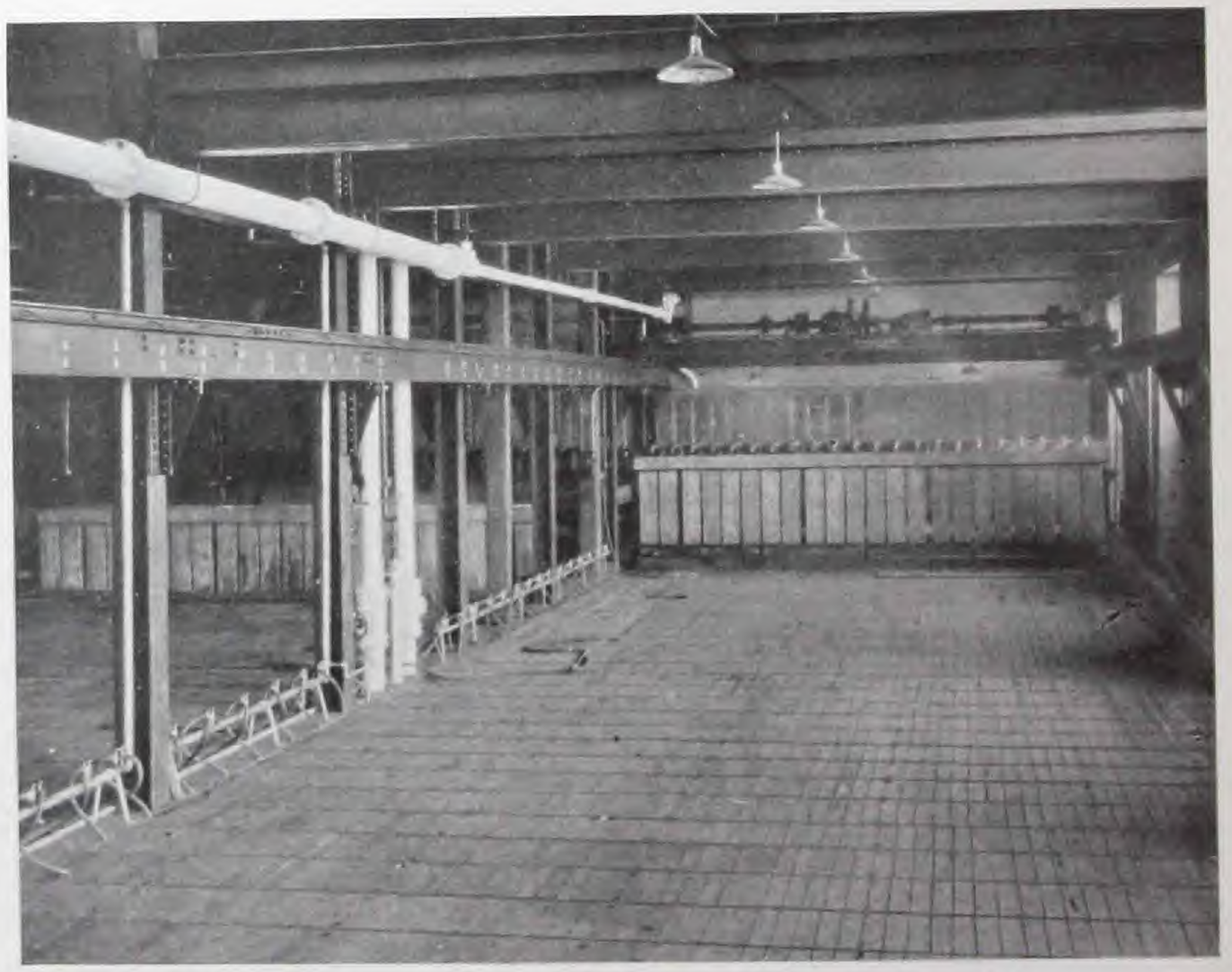
Electric cranes are employed with group lift, each crane being designed to fit the tank and grids with which it is used. For full-row lift the crane need have but two motors, one for raising the cans vertically and another for traveling to the end of the tank. When only part of a row is lifted at a time, a crane with a third motion, across the width of the tank, is required. In order to dump the cans without releasing the crane hooks, the crane must have suitable rope drums at right angles to the plane of motion of the hooks as the grid is lowered.

With Frick group-lift systems we furnish only the best grade of cranes as built by manufactures of recognized standing. Ample experience with various sizes of cans and length of lift is our guide in selecting the proper crane for each freezing system.

Dip Tanks for Group Lift

Dip tanks for group-lift systems are made oversize to accommodate the greater number of cans to be immersed in proportion to the volume of water in the tank. To allow for quick overflow of the excess water, large pockets are provided on the outside of the tank, the top of the pockets being below the level of the rim of the tank. Water inlet and drain connections are of course included.

The dip tanks are made of 3/16" or 1/4" steel, to suit requirements, and are riveted and caulked to be watertight. A stiffening brace of angle iron is riveted around the top of the tank, which is set level with the can covers and curbing of the ice tank.



Full-row Group Lift in a 100-Ton Plant, Baltimore, Md.

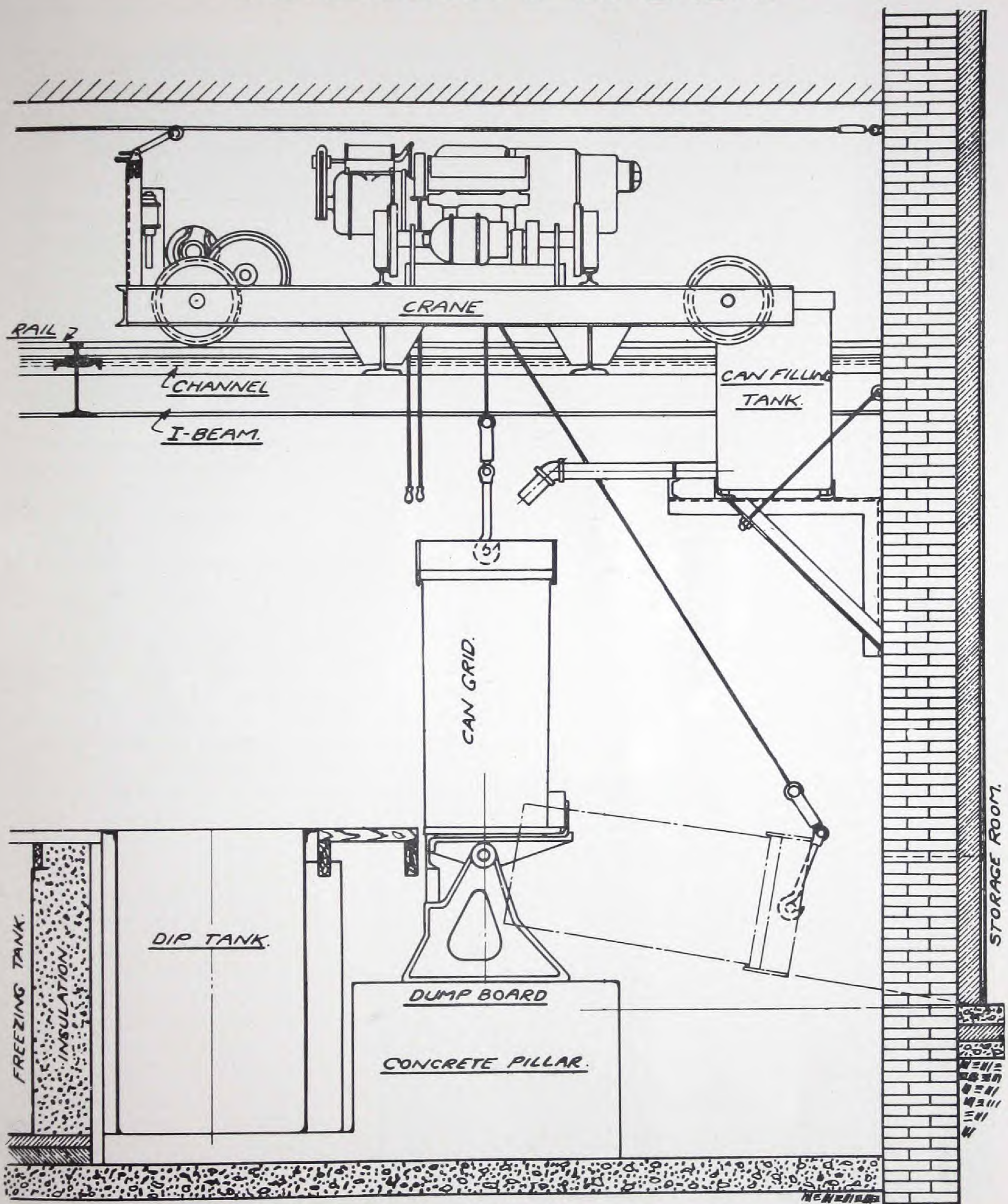


Diagram Showing Arrangement of Dip Tank, Dump Board, Crane and Can Filler for Group-Lift Plant

It is customary to remove and replace the drop tubes, used for agitation with raw-water systems, while the cans are suspended in the dip tank.

Dump Board for Group Lift

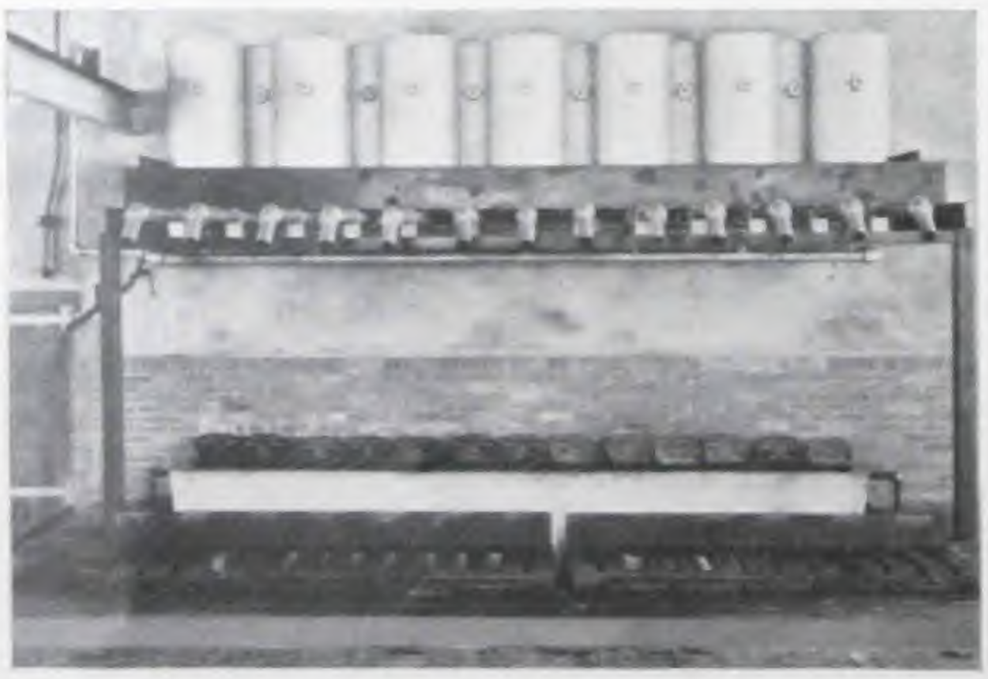
Special dumping equipment is furnished for group lift plants, to make it possible to harvest the ice without removing the crane hooks from the grids. This equipment consists of a hinged frame or "board," mounted on heavy trunnions, and so weighted that it remains in a horizontal position until the cans are lowered upon it when it tilts forward (see sketch) due to the off-center position of the pivot. A stout rail at the front edge prevents the cans from slipping off the board as it is inclined.

The board is made of steel channels and angles, to which are secured wooden pieces to take the shock and wear of the cans. The weights and trunnion frames are castings, the whole being mounted on a concrete pillar, giving a rigid and durable dumping device.

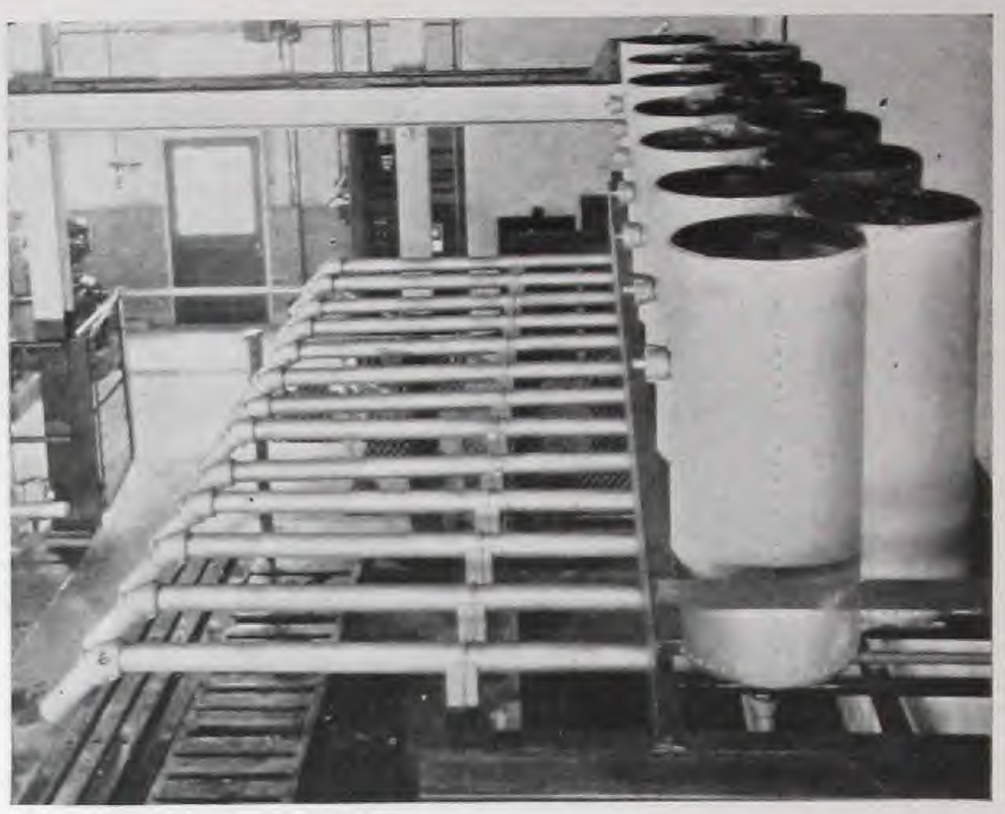
Can Filling Tanks for Group Lift

Filling the cans at the dump is invariably the practice with can grid group lifts. The filling tanks are mounted on the wall above the dumping space, with pipes extending out to reach the cans when they are in place on the dump board.

The filler is arranged with a separate enclosed compartment or pressure tank for measuring the water fed to each can: the valves at the opening of each of the feed pipes are all controlled by a



Pressure-type Can Fillers are Adjustable; They Fill All the Cans Equally, to Any Height Desired



Top View of Pressure-type Adjustable Can Filler, Showing Adjusting Stems

single lever which the operator pulls, to start the flow of water.

This lever also holds closed the water inlet valve, which upon the release of the lever, controls the refilling of the tanks.

Galvanized steel is used for these tanks, the best of valves and fittings being employed to insure reliable action and even filling of the cans. The tanks are supported on steel frames, either hung to the wall of the ice storage or resting on uprights at the ends of the filling tanks.

An important feature of this improved type of can filler is that it permits the amount of water fed to the can to be varied, to suit the requirements of the trade.

Each pressure tank is provided with an adjustment, which is operated by a "valve" stem extending through a stuffing box, as illustrated; this allows the quantity of water going to the cans to be accurately regulated so that every block of ice has the same weight; the adjustment further makes possible the changing of the size and weight of all the blocks of ice, if necessary, to meet competition, or for modern distribution methods, scored ice, etc.

The tanks are supported on steel frames, either hung to the wall of the ice storage or resting on uprights at the ends of the filler. The individual pressure vessels are carefully made, galvanized inside and out, and tested to insure tightness.

INDIVIDUAL CAN LIFT

Freezing Tank Framework

The standard tank framework constructed by Frick Company is simple and the most easily erected type known to us. It is made of green wood obtained directly from the mill, which is then air dried only to a certain point. The use of this lumber insures the framework against serious swelling after it becomes damp from use.

The main stringers are heavy lumber, while the cross pieces between each can are lighter and are toe-nailed to the main stringers in grooves cut for the purpose. All joints in the main stringers are of the lap and screw type.

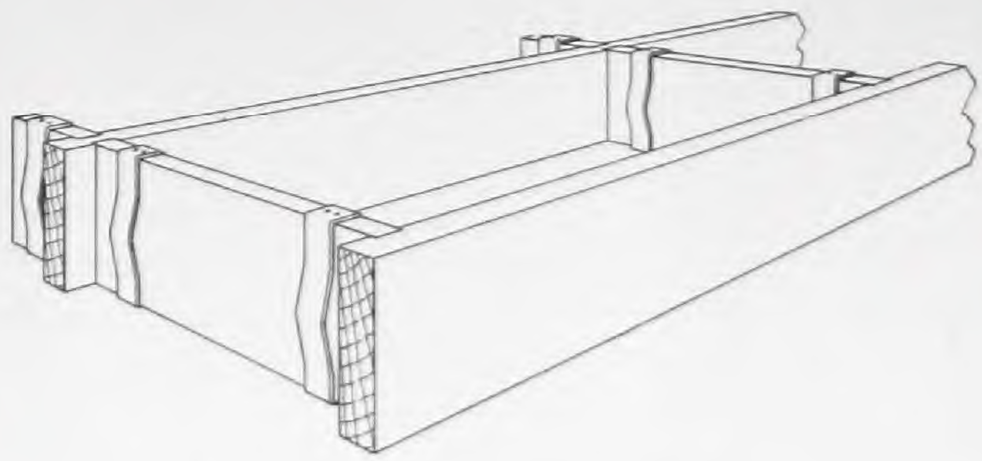
These parts are carefully crated and held together by iron straps, so that there is no danger of warping while in shipment. Each part is numbered and so packed that by following the number scheme the erection is made simple.

The framework for the ice-making systems in which wooden frames are used at all, is identical with the exception of the notching for the raw water systems. When air agitation is not required the notching is omitted.

The can covers are made of two layers of 7/8" lumber laid opposite ways to prevent warping and securely fastened together with large wood screws. Lifting eye bolts of iron are permanently fastened in the covers. The covers are given a coat of filler paint before shipment.

Frick standard framework and covers are made of heavy selected oak, unless otherwise specified at time of ordering.

The cans are held firmly in place in the wood framework by means of four holding-down clips of galvanized spring steel, which are arranged to lock the can in position on both ends. This device has proved to be the simplest and most effective means of keeping the cans in the desired position, in tanks using individual can lift. Where Frick can grids are installed, for group lift, the system is designed to give proper submergence of the cans without requiring the holding-down strip.



Holding-down Strips of Spring Steel

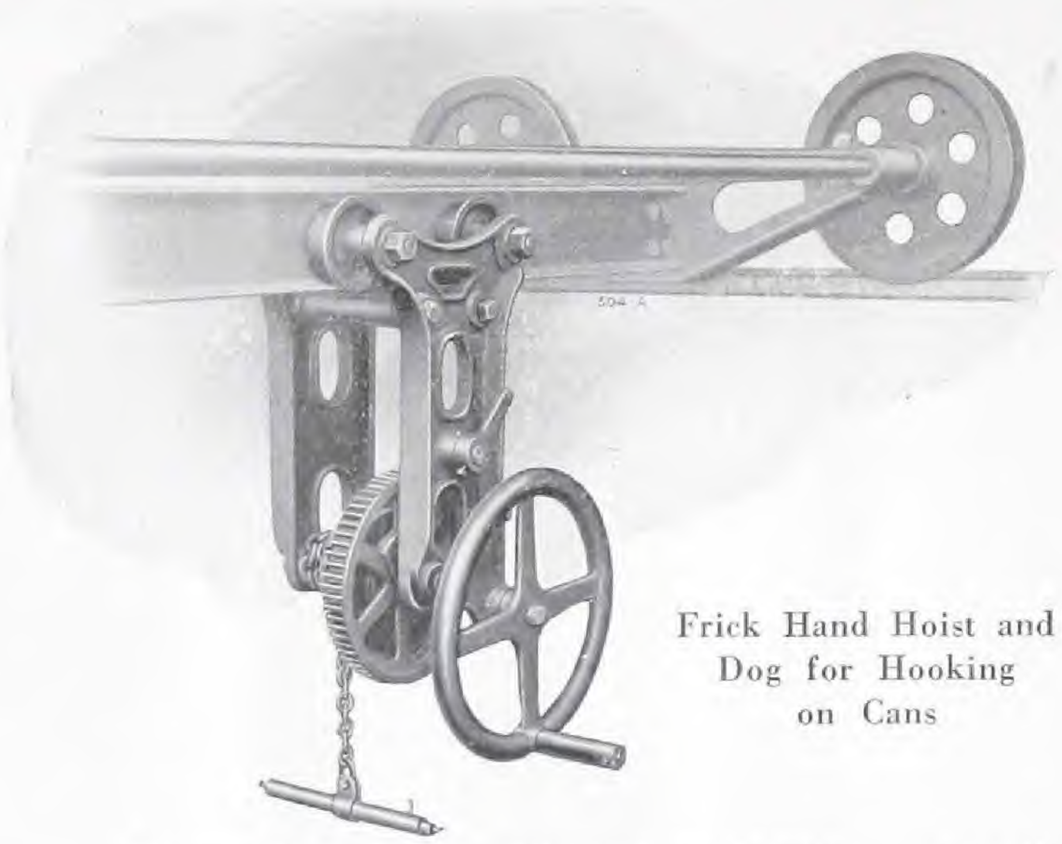
Cranes

The crane and hoist play an important part in the harvesting of the ice and must be of best construction throughout to give lasting service. Frick Company manufactures hand pushed cranes and hand and pneumatic hoists as illustrated. Electric hoists and electric traveling cranes of the best standard makes are supplied to suit conditions. Frick lifting rigs for handling a number of cans at one time are of simple, sturdy construction and prevent the cans from swinging out of place.

Wood Framework Arranged to Accommodate the Patented F-P System for Making Raw-water Ice. (Wooden Hold-down Strips Here Shown.)

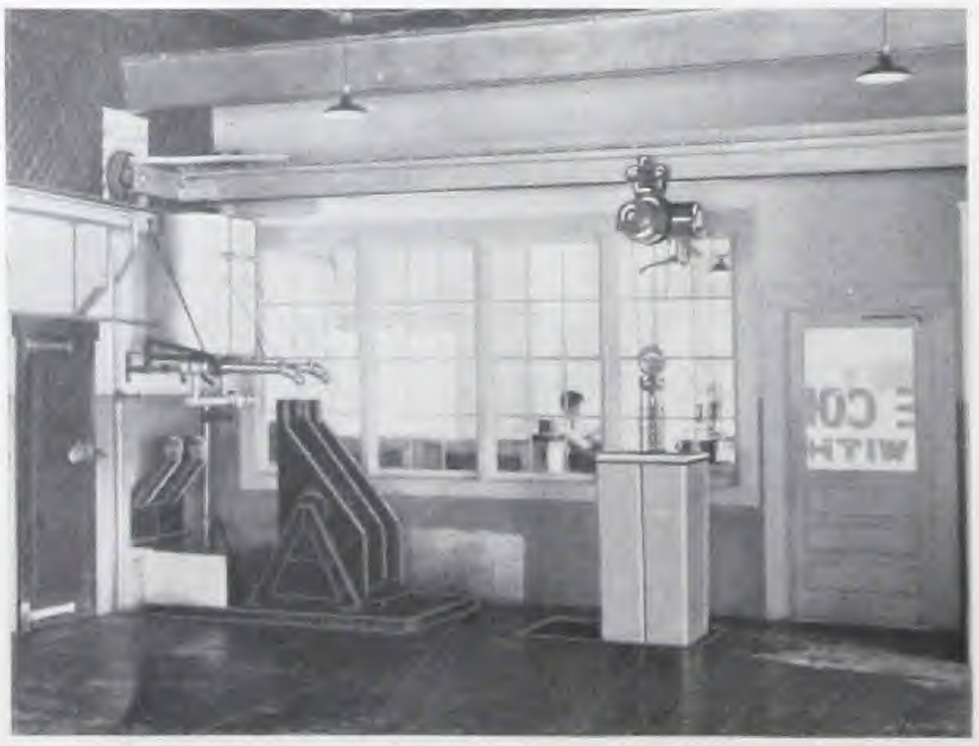
Crane for Hand Hoist

Frick crane bridge and trolley wheels are equipped with roller bearings, and the wheels are carefully machined to insure easy travel.



Frick Hand Hoist and Dog for Hooking on Cans

All moving parts subjected to friction are well lubricated. Cross beams and all parts subjected to strain are liberally proportioned and will safely carry the loads met in practice. In the case of pneumatic cranes, the air used for operation is led through suitable rubber hose attached to trolleys in such manner that, for all positions of the crane the hose does not interfere with any of the work in the tank room. The choice of a suitable crane will depend on the power available and the duty required of the crane. There is a Frick crane to meet any condition.

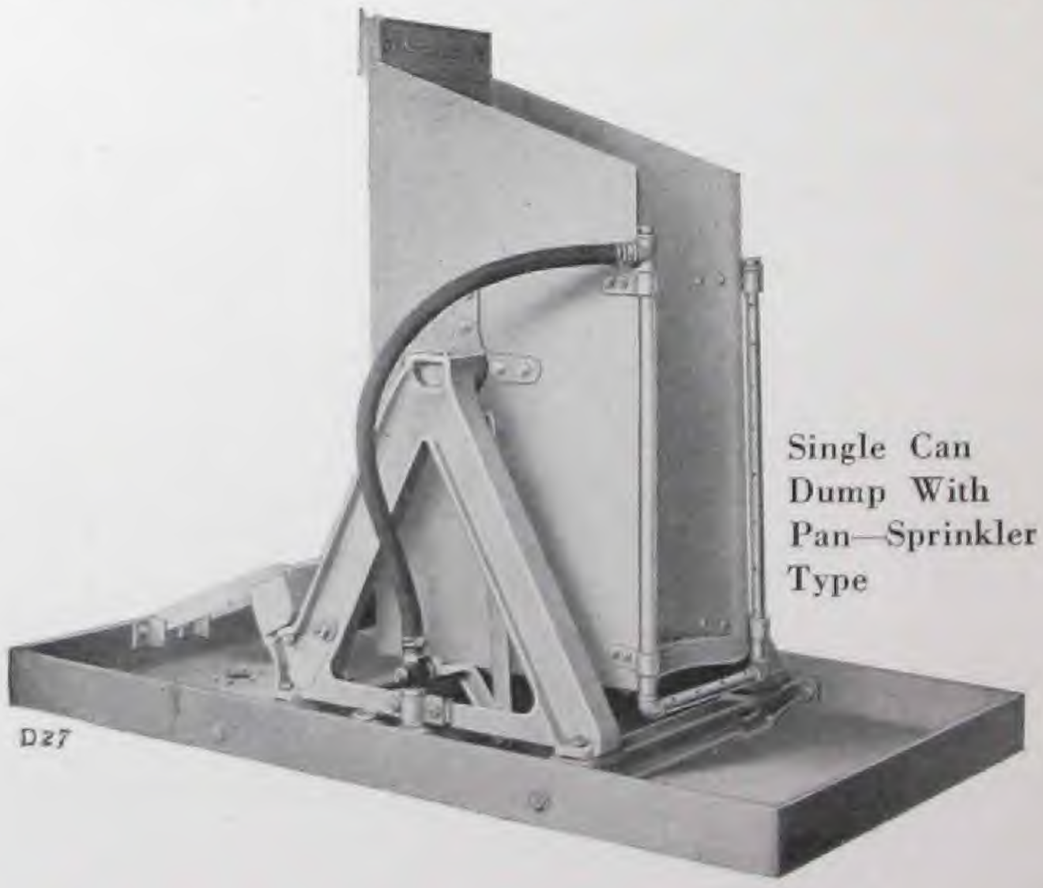


Typical Small Electric Hoist for Handling Two 300-lb. Cans

Can Dumps

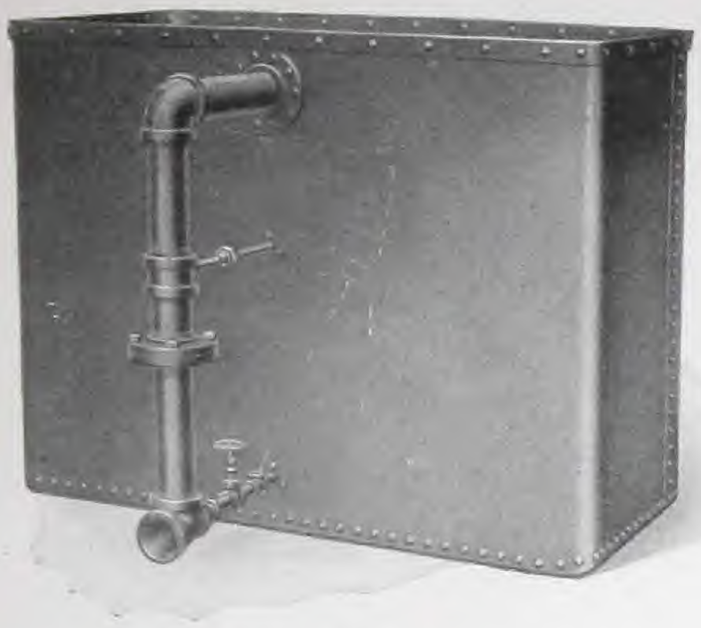
Frick can dumps are made throughout of iron, wood lining being used only for supporting cans in the cage; they are furnished to accommodate one, two, three or more cans. The single can dump is furnished with or without sprinkler pipes for thawing the ice from the cans, while the multiple dumps are always used in connection with dip tanks. Up to four cans the dumps are usually hand operated, and in order to make the operation easy they are mounted on trunnions, so that only a very small force is required for dumping. The weights are so distributed that the dump automatically returns to or near its normal position after the ice has been dumped. When equipped with sprinkler pipes, the water supply is automatically cut off as soon as the dump returns to its normal position, and is automatically turned on when in a dumping position.

For harvesting several cans at one time, the dump can be provided with hydraulic power, which acts through a piston, to tilt and return the dump.



Single Can Dump With Pan—Sprinkler Type

ICE AND FROST



Dip Tank for Four Cans

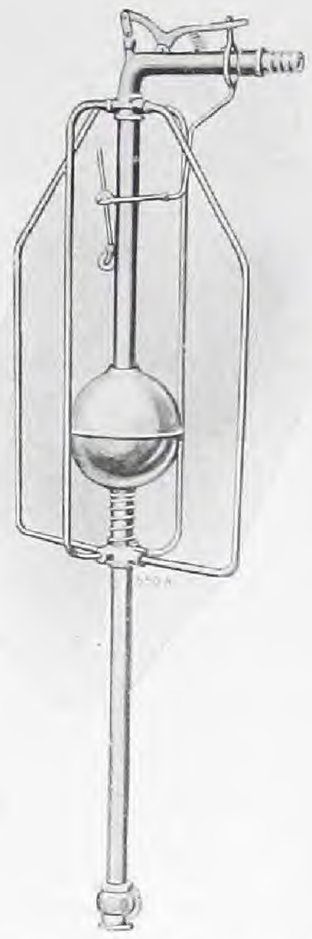
Dip Tanks

Frick Company has a complete line of standard dip tanks for thawing the ice loose from the cans. The small dip tanks are made of 3/16" tank steel while larger sizes are made of ¼" material. Dip tanks are provided with inlet, overflow, and drain connections complete. See diagram on page 15, showing location of the dip tank and can fillers.

Can Fillers

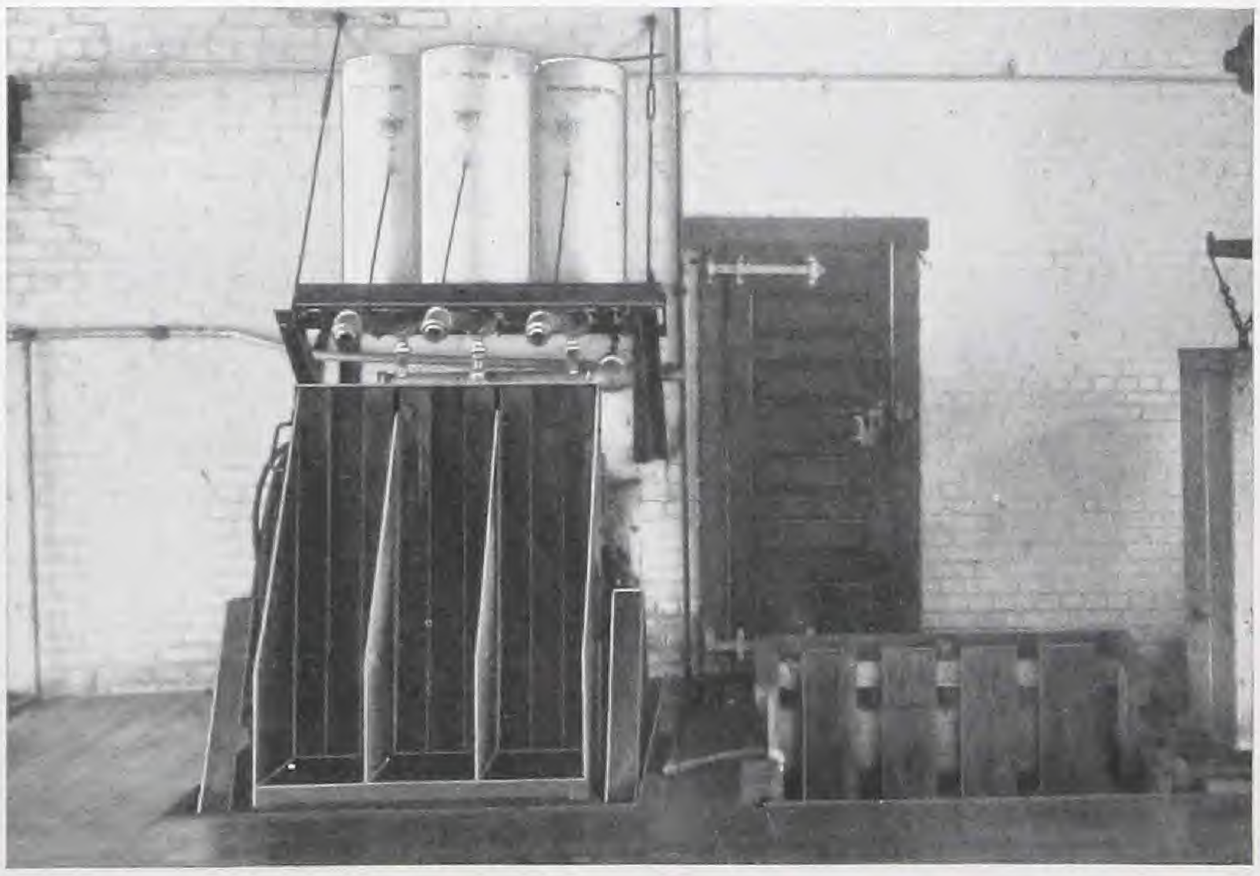
When the ice cans are refilled with water at their place in the tank, use is made of an apparatus under control of a float valve which so operates as to cut off the water supply when the water has reached a certain predetermined height in the cans. This apparatus, which is made of brass and copper, has demonstrated its reliability throughout many years of service. It is shown in the illustration at the upper part of this page.

In medium and large size raw water ice plants, it is often preferable to fill the cans at the can dump. The Frick measuring tank type can filler is an ideal device for automatically filling the cans in the dump, and by its use the cans can be filled to exactly the proper height in a short time. One pull of the valve lever fills all the cans at the same time, while a push of the lever closes off the openings to the cans and opens the water valve to the filling tank.



Can Filler, as Used on Small and Medium-sized Tanks

This filler is the same pressure-tank type described under the heading of group lift equipment; the number of water tanks is simply made less, to equal the number of cans lifted at one time. The filler affords the advantages, discussed on page 16, of adjustment to fill each can equally, and variation of the quantity of water fed to the cans, to suit trade conditions. Since their introduction a few years ago this type of filler has found wide popularity, replacing earlier types in many plants.



Wall-type Can Filler and Dump, for Handling Cans in Multiple

RAW WATER ICE-MAKING EQUIPMENT

To Make Clear Ice from ordinary drinking water (without going to the expense of distilling it) it is necessary to agitate the water while it is being frozen in the cans. For this purpose a stream of air is passed through the water. Experience dating back to the nineties, with various types of air agitating equipment, resulted in the development in 1923 of a vastly superior air agitating system, using air at a very low pressure. This is known as the F-P (Frick Pendulum) System. Its ability to make beautiful clear ice from untreated water and its economy of operation have put the F-P System in over a thousand plants, or one out of every six in the country.

Bracket for F-P Tube, Showing Clamp Spring and Special Pivot

As the ice freezes inward, the tube cannot stick off center, but its motion is gradually restrained until it is frozen in the center of the core. Experience has shown that by this method the core will be of negligible size.

Glass-sided Can Showing Central Position of F-P Tube

The patented F-P tube is suspended in the middle of the can by means of a pivot, so arranged that the tube is free to swing across the can from side to side, but is restrained from motion in any other plane. The result of this arrangement is that the tube acquires a pendulum motion in the water, allowing the agitation to wash thoroughly each of the flat surfaces of the ice in turn. See photograph opposite and also that shown on page seventeen.

Ice Made with Patented F-P Tubes from Raw Water at Plant of the Citizens Ice Co., Pawtucket, R. I.

Furthermore, by having the tube centered in this way, we guard against injury to the ice in case the power should fail and the blower be stopped temporarily, for the tube is surrounded by the unfrozen water, and the openings are not frozen shut while the power is off. The F-P tube is provided with carefully located perforations along its length, which provide necessary agitation after the bottom of the tube is frozen in the ice. There are no pin-sized holes in the air fittings to become stopped up with moisture. Little or no white ice.

The use of air at a very low pressure, (two pounds and less) means a large saving in horsepower with the F-P System. A simple blower takes the place of the air compressor and air tank. In the F-P System there are no dehydrators to be maintained, and through which the air must be forced.

75-Ton Brine Race Tank With Vertiflow Unit in Operation at Stamford, Conn.

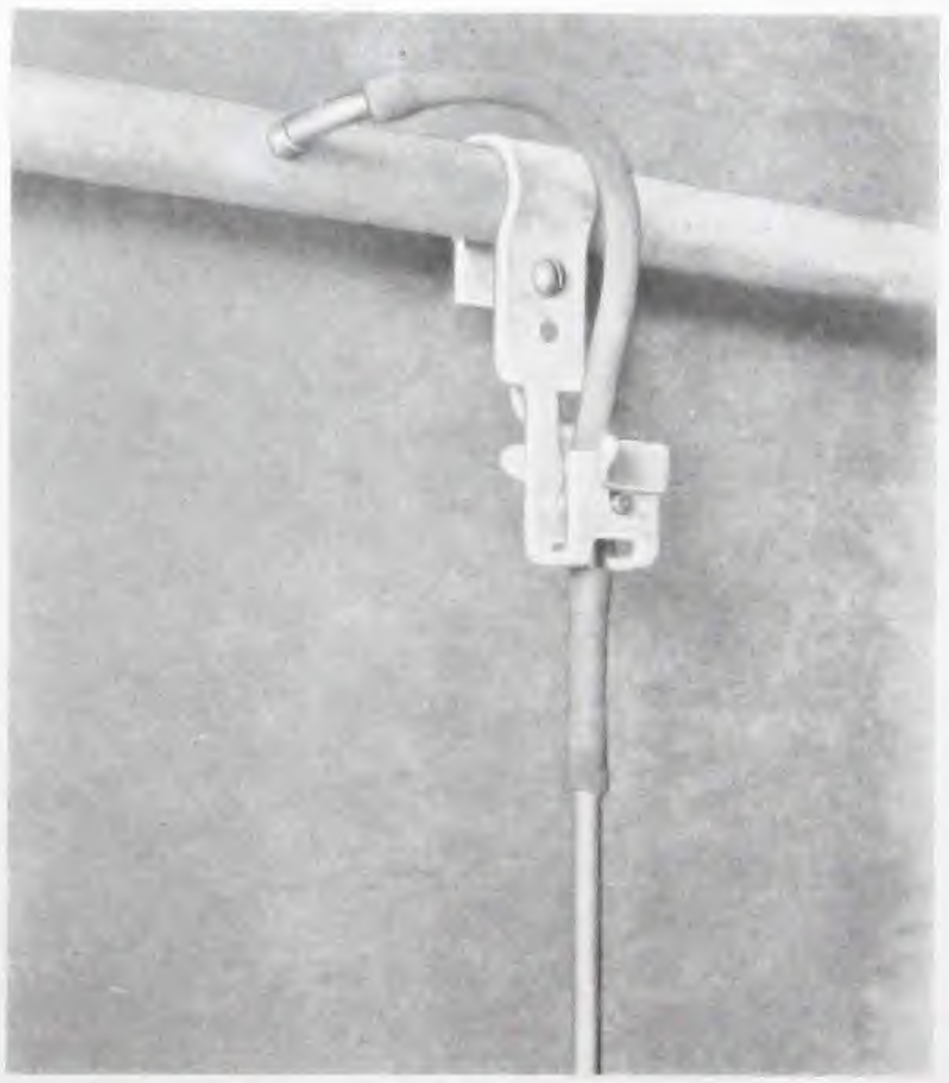
The air is drawn into the blower from under the tank top, where a cool supply is always available. By recirculating the air we save much of the refrigeration other systems require for the dehydrating set.

The F-P bracket clamps rigidly on the edge of the can and is easy to attach or detach. It is heavily galvanized, while the clamping spring and tube are made of brass assuring a lifetime of service.

Skilled labor is not required for handling the F-P System. Every part is strongly made, foolproof and durable. The air equipment practically takes care of itself.

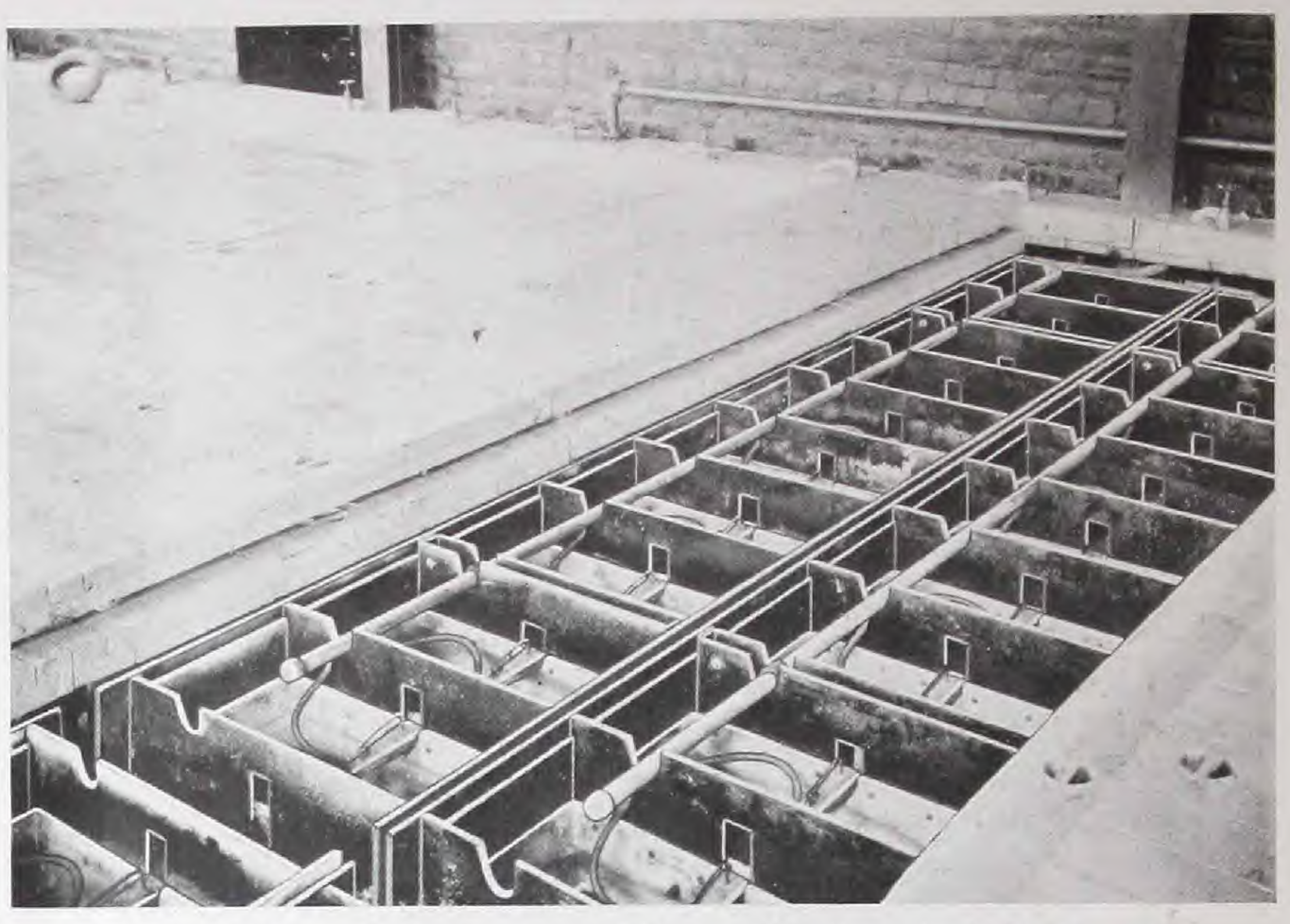
110-Ton F-P Brine Race, Vertiflow Unit Tank Operating on the Dual Pressure System of the Artificial Ice Co., Kansas City

Hundreds of small and medium sized ice plants using individual can lift have installed the F-P System with Frick Oak Framework, the results being successful in every respect.



Detail View of Offset Bracket and F-P Tube Attached to Removable Air Lateral Used with F-P-R System

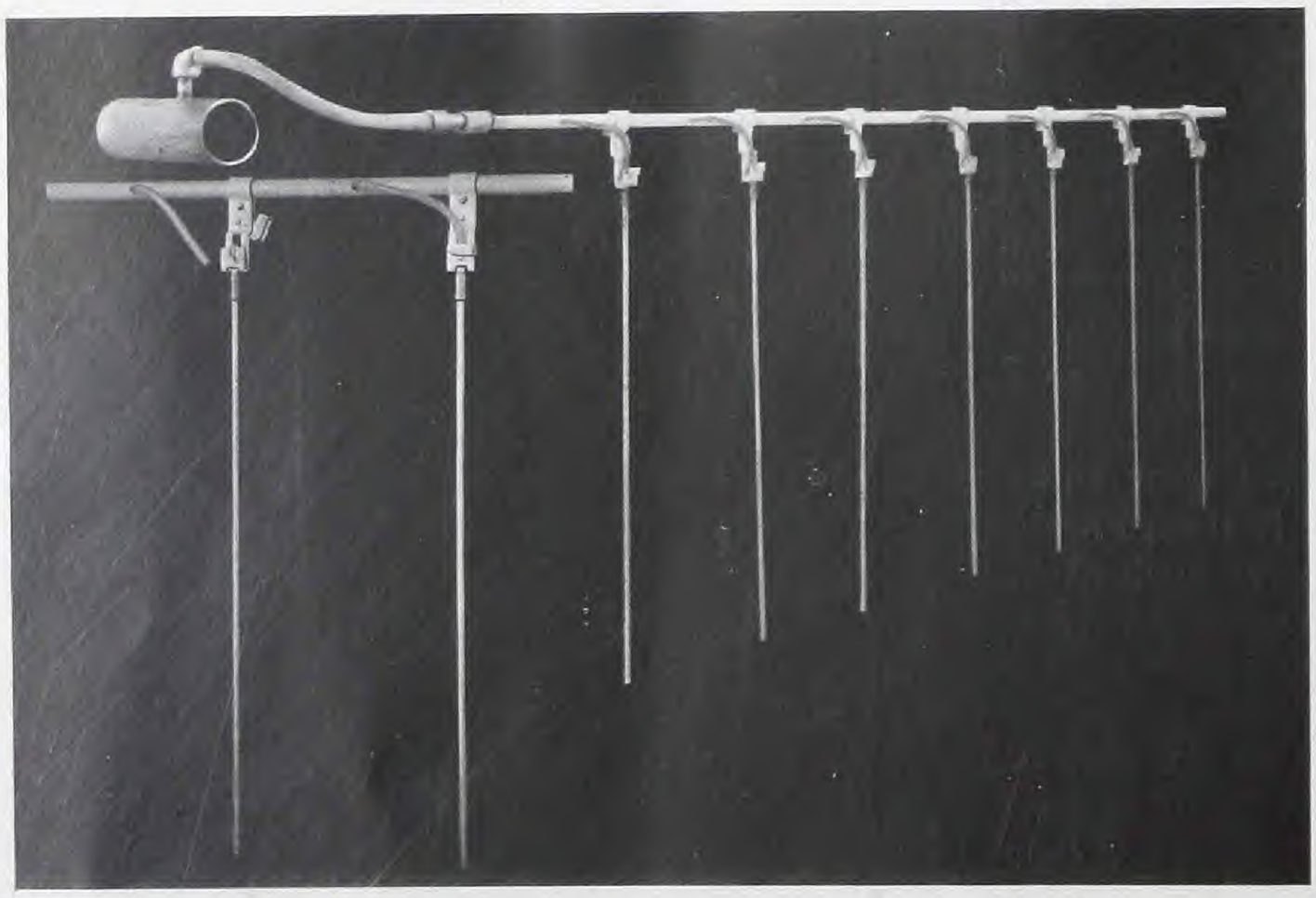
The F-P System also adapts itself perfectly to Frick Can Grids for group lift. The air laterals are arranged to swing out of the way when the ice is being dumped. With this combination one tank man per shift can handle up to 100 tons of ice.



Grids for Half-row Group Lift in a Medium-sized Plant

F-P-R System

In Ice plants where the water is suitable, the F-P tubes can be removed before they freeze into the ice. For group lift plants desiring this practice, we offer a modification of the standard F-P System so arranged that both the air laterals and the drop tubes can be lifted out, at will. The regular F-P bracket is replaced by an off-set type which is permanently clamped to the removable lateral (see illustration). If one of the tubes should become frozen in, it can be disconnected at the rubber sleeve joint, just below the pivot, and left in the ice until the grid is moved to the dip tank; or, the thawing needle can be inserted at once, the offset in the bracket being provided to permit this operation. This style of equipment is called the F-P-R System.

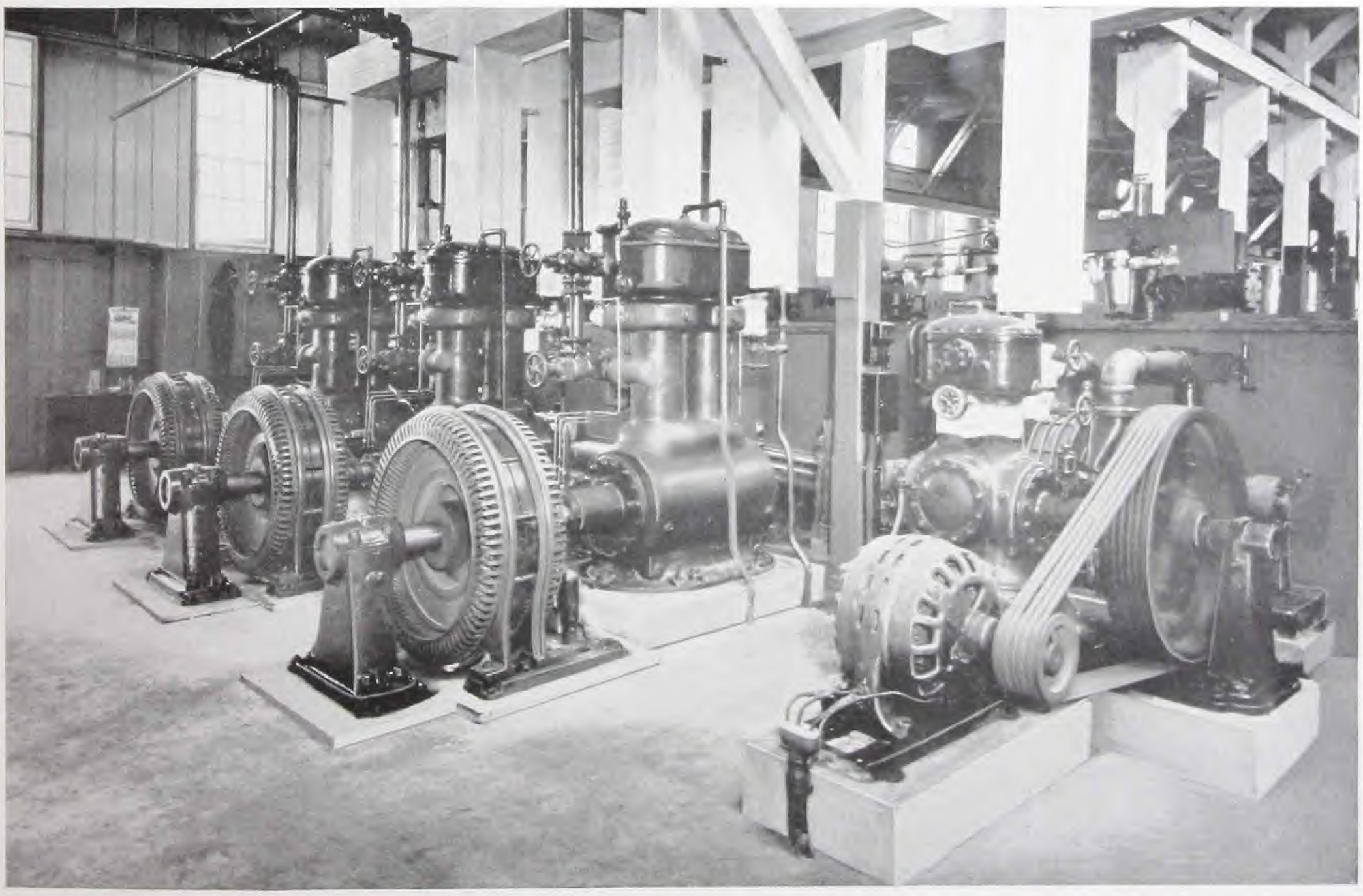


Assembly and Detail Views of Removable Air Lateral and F-P Tubes with Offset Brackets as Used in the F-P-R System. Center Detail Shows Locking Device in the Open Position

Excellent results are being obtained with the F-P-R System in many places. It recommends itself for cases where the quality of ice made with the regular F-P Tubes is really higher than good practice calls for, in the locality, and offers a certain saving in labor. It should be borne in mind that the F-P-R bracket is arranged to permit the freezing-in of the tubes, should this prove advisable; they can then be thawed and removed individually from the brackets and lateral.

ICE AND FROST

Two Group Lift Tanks Each Making 100 Tons of Ice per Day at the Jacksonville Plant of the Atlantic Ice and Coal Co.



Three of the Four Large Dual Pressure Compressors at Work in the Plant of the Atlantic Ice and Coal Co., Jacksonville, Fla.

FRICK

Works of Frick Company at Waynesboro, Pa., Covering 30 Acres

IN order to give our customers the best service possible we have established Branch Offices and Distributors throughout the country. They are qualified to give expert engineering service as well as to quote prices on your requirements. *The Branch Offices handle primarily large ice and cold storage plants, and other work of special importance; the Distributors furnish medium size and smaller equipment.* Write or call on the nearest representative for information and prices.

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